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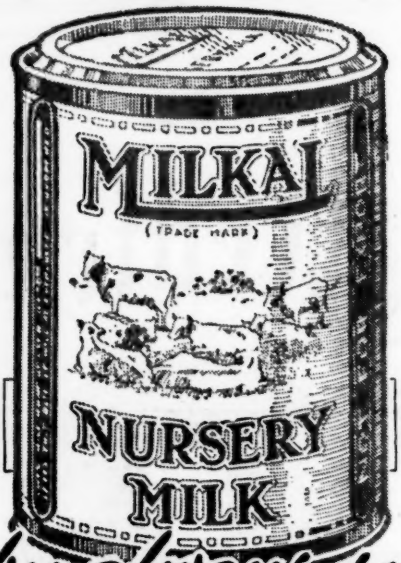

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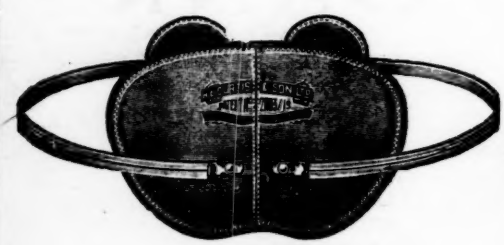

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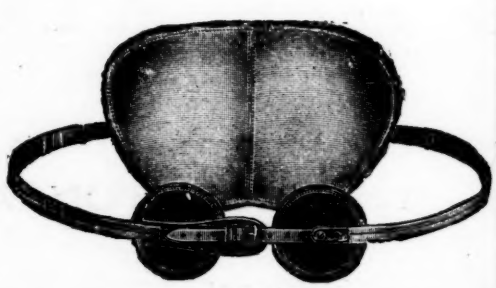

BACK VIEW.

An Address

ON THE

RESULTS OBTAINED IN SOME EXPERIMENTS IN WHICH THE FACIAL AND RECURRENT LARYNGEAL NERVES WERE ANASTOMOSED WITH OTHER NERVES.*

BY

SIR CHARLES BALLANCE, K.C.M.G., C.B., M.S., F.R.C.S.

BEFORE describing some of the experiments which have been performed, I must state that the results have been controlled by a team of workers, and that I am only one member of the team. Mr. Colledge has been responsible for reports on the condition of the vocal cords, and has actively helped me in many other ways; Dr. Lionel Bailey has reported on the electrical condition of muscles; and Dr. Eidinow on the movement, or absence of movement, of the diaphragm. Further, I have had the great advantage of the inspiring presence of Sir David Ferrier at the majority of the experiments; and his enthusiasm and critical judgement of the results obtained have been of the greatest value. My friend, the late Professor Shattock, was always keenly interested, and was present at each experiment till his physical strength, alas! failed. Dr. Dale, too, has been of the greatest help to me in the carrying out of these experiments.

Each result, which I shall briefly mention, has been obtained, not by one experiment, but by several. The animals used were monkeys, and the problems submitted to experiment could only be solved, I believe, by the method employed.

THE EVOLUTION OF THE OPERATION FOR THE CURE OF FACIAL PALSY.

The first operation for the relief of facial palsy was done in 1895. The operation selected was an end-to-side anastomosis of the facial and spinal accessory nerves. Following this first operation surgeons devised several diverse methods of uniting the facial to the spinal accessory. For example, Grant of Denver and Kummer of Geneva divided the spinal accessory and united it end-to-end to the trunk of the facial. The descendens noni was then divided, and its proximal end was united end-to-end to the distal cut end of the spinal accessory. This latter anastomosis was done in order to obviate the paralysis and atrophy of the sterno-mastoid and trapezius; but this was a vain hope: the nervous current passing through the descendens noni failed to prevent serious atrophy of the trapezius, and, moreover, the depressor muscles of the larynx lost their nerve supply.

It was thought at first that injury to the spinal accessory nerve would be compensated for after a time by the direct cervical nerve supply of the sterno-mastoid and trapezius; but this idea soon proved fallacious.

The main result of all facial-spinal accessory anastomoses, and often the only permanent one, was associated movements of the face and shoulder, and deformity of the neck and shoulder. Symmetrical, subconscious, emotional movement of the two sides of the face, the movement most desired, most frequently failed to appear; and thus real recovery eluded attainment. It is natural, then, that the search should be made for some other nerve which might give better results when anastomosed with the facial than with the spinalis.

The hypoglossal nerve was next anastomosed in various ways with the facial. Facial-hypoglossal end-to-side and facial-hypoglossal end-to-end anastomoses were performed; but these left partial or complete atrophy of half the tongue; so attempts were made to prevent the atrophy of the tongue by bringing a strip of the spinalis across the neck and uniting it end-to-end to the divided distal end of the hypoglossal; or by dividing the descendens noni and uniting the proximal end to the distal cut end of the hypoglossal.

The facial-hypoglossal anastomosis gave some excellent results; but for a long time, an indeterminable time, there was associated movement of the face with the act of eating and swallowing; so that in one patient twenty months after operation, and in several monkeys, active movements of the muscles of the corresponding side of the face during a meal were observed, and in the case of the patient were embarrassing and annoying. The problem seemed one, as I have said, that could only be solved by experiment.

In the following table the results of facial-descendens noni anastomosis, of facial-descendens noni and facial-communicans noni anastomoses, facial-lingual anastomosis, and facial-glosso-pharyngeal anastomosis are shown.

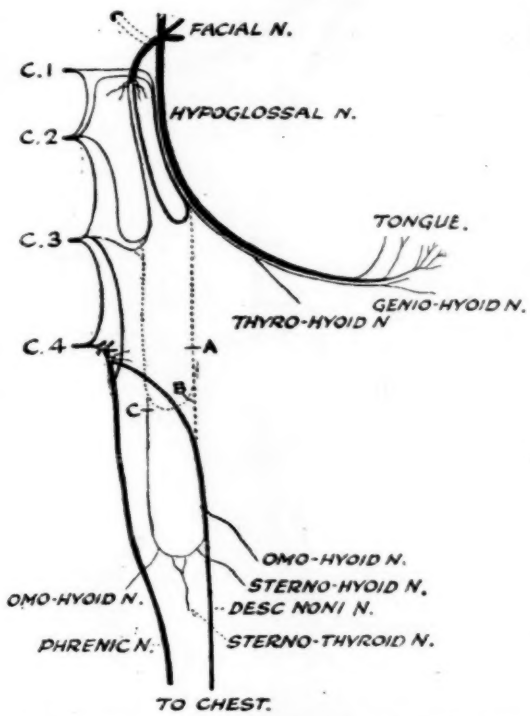

FIG. 1.—Diagram of Facial-Descendens noni anastomosis (end-to-end) and Facial-Communicans noni anastomosis (end-to-end). *Operation.*—A, Site of section of descendens noni nerve. B and C, Sites of section of communicans noni nerve. The figure shows: (1) Descendens noni facialis anastomosis (end-to-end). (2) Descendens noni phrenicus anastomosis (end-to-side). (3) Communicans noni facialis anastomosis (end-to-end). (4) The distal cut end of the communicans noni was so minute that no attempt was made to suture it to another nerve. The operation was done on a fairly large monkey. The descendens noni was relatively a large nerve which descended into the chest, while the communicans noni nerve was very small, and could only be followed with the aid of a magnifying glass. It will be noticed that the two nerves communicated rather high up, and that there was another "ansa" lower down, from which the nerves to the depressor muscles of the larynx were given off.

RETURN OF RESPONSE TO FARADIC STIMULATION IN FACIAL MUSCLES.

1. *Descendens noni-Facial Anastomosis (end-to-end).*
   - 4 months: Response of all muscles except occipito-frontalis to strong current.
   - 8 months: Response of all muscles to weak current.

2. *Descendens noni-Facial Anastomosis (end-to-end) and Communicans noni-Facial Anastomosis (end-to-end).*
   - 1½ months: Slight response in orbicularis oris and levator labii superioris.
   - 3 months: All muscles react to fairly strong current.
   - 4 months: All muscles react to weak current.

3. *Lingual-Facial Anastomosis (end-to-end).*
   - 2½ months: No response.
   - 3 months: All muscles respond to strong current except occipito-frontalis.
   - 4 months: All muscles respond—current less strong.
   - 5 months: Same report—strong current still required.

4. *Glosso-pharyngeal-Facial Anastomosis (end-to-end).*
   - 6 weeks: No response.
   - 3 months: All face muscles respond to weak current. Face symmetrical during eating of an apple and when angry. Eyelids do not wink together quite harmoniously.

In another experiment, in two months all muscles react to same strength of current as those of the opposite or normal side of face.

It is of great interest to note that the face recovered much more quickly when the communicans noni and descendens noni nerves (Figs. 1 and 1A) were both attached to the trunk of the facial nerve, than when the descendens noni nerve was alone attached to the facial.

The lingual-facial anastomosis (Fig. 2) has not been a failure: the face has become symmetrical in repose, and the palpebral fissure on the paralysed side is not wider than that

[3. 2 :

* Delivered at a joint meeting of the Sections of Laryngology and of Otology of the Royal Society of Medicine, June 27th, 1924.

on the normal side; but there has been a great delay in the return of normal faradic reaction in the muscles, and it is not yet clear that this will take place.

As long ago as 1895 Sir Edward Sharpey Schafer recommended me to use the glosso-pharyngeal nerve for anastomosis with the facial; but the advice was not accepted. The glosso-pharyngeal nerve is small and comparatively inaccessible. The spinal portion of the spinal accessory nerve, and the hypoglossal nerve, appeared to be so placed and so much larger than the glosso-pharyngeal nerve that for the time the latter nerve was rejected.

The remarkable results of the monkey experiments in which the facial was anastomosed to the glosso-pharyngeal *end-to-end* (Fig. 3) appear to require some explanation.

1. Jacobson's nerve, which arises from the petrous ganglion of the glosso-pharyngeal, enters a small canal in the bone, ascends to the inner wall of the tympanum, and divides into branches which form the plexus tympanicus. This plexus is in communication with the facial nerve.

2. There is a branch of communication between the facial and glosso-pharyngeal nerves outside the skull which extends from the stylo-mastoid foramen to the trunk of the glosso-pharyngeal just below the petrous ganglion. This communicating branch is not referred to in detail in English and Scottish "Anatomies." Testut (1905) figures it (Fig. 4), but the figure is copied from Bourgery's *Atlas* (1844). Meckel (1825) described it; Sappey (1872) described it as the "ansa of Haller," and on looking up Alberto v. Haller (1762) I found a description of this communication between the facial and glosso-pharyngeal nerves. It may be that this "ansa of Haller" has some bearing on the rapid recovery of the paralysed face following facial-glosso-pharyngeal anastomosis.

3. The motor nucleus of the facial nerve lies just above the motor nucleus of the glosso-pharyngeal nerve in the medulla oblongata. It is possible that there is some communication between these two nuclei.

Fig. 1A.—Microscope section (Stroebe stain for axis cylinders), showing anastomosis of the facial nerve with both the descendens noni nerve and the communicans noni nerve. The drawing was made from a study of serial sections. This specimen was obtained four months after the operation. Same case as Fig. 1.

When the glosso-pharyngeal nerve is used for anastomosis with the facial, its branches of distribution — tympanic carotid, muscular, and tonsillar—are not interfered with in any way. The nerve is divided beneath the upper and back part of the hyo-glossus muscle at the point where it commences to divide into lingual branches. The only result of such division would appear to be the loss of sensation and loss of taste over the back of the corresponding side of the tongue for one-third of its surface.

There is some difference among authorities in the description of the distribution of the glosso-pharyngeal nerve. The muscles of the pharynx and palate receive their nerves from sources not yet completely determined. Halliburton writes (*Handbook of Physiology*):

"It contains motor fibres to the stylo-pharyngeus and probably to the levator palati and other muscles of the palate, except the tensor, which is supplied by the fifth nerve. The nerve also contains fibres concerned in common sensation, and the sense of taste, and secretory fibres for the parotid gland."

In *Quain's Anatomy* the following sentences occur:

"The glosso-pharyngeal nerve divides as it passes beneath the hyo-glossus muscle into two parts. One turns to the upper surface of the tongue, and divides into many branches, which supply the circumvallate papillae and the mucous membrane over the posterior third of the organ, the hindmost filaments reaching the anterior surface of the epiglottis. The other is smaller, and is distributed to the mucous membrane of the side of the tongue, extending to about the middle of its length, where it forms a communication with the lingual nerve." "The constrictor muscles are supplied by the pharyngeal plexus, their motor fibres being derived from the bulbar portion of the spinal accessory nerve, and in the case of the middle constrictor from the glosso-pharyngeal. The stylo-pharyngeus is innervated by the glosso-pharyngeal. The inferior constrictor receives branches from the external and inferior laryngeal nerves."

Testut (*Traité d'Anatomie Humaine*) says the stylo-glossus and stylo-pharyngeus are supplied by the glosso-pharyngeal nerve.

Morat (Fonction d'Innervation, in *Traité de Physiologie*, by Morat and Doyon) says that general sensibility and taste, after section of the glosso-pharyngeal nerve, are lost on the back of the tongue.

Chauveau, on excitation of the nerve, has seen contraction of the inferior constrictor and of the muscles of one side of the palate; and Vulpian has seen congestion of the base of the tongue in the field of distribution of the glosso-pharyngeal nerve.

Poirier and Charpy figure branches of the glosso-pharyngeal nerve to the stylo-glossus, stylo-pharyngeus, and the pharyngeal plexus.

"The motor portion of the nerve takes part in the innervation of the muscles of the pharynx, the muscles of the soft palate, and of certain muscles of the tongue."

Cunningham writes:

"The glosso-pharyngeal nerve consists of a smaller motor element which supplies the stylo-pharyngeus, and a larger sensory part which supplies the pharynx and tongue." "The lingual branches supply the mucous membrane and the vallate papillae of the dorsal third and lateral half of the tongue, extending backwards to the glosso-epiglottic folds and the front of the epiglottis." "The constrictors of the pharynx receive their nerve supply through the pharyngeal plexus from the *accessory nerve*. The inferior constrictor is supplied also by the external laryngeal and recurrent branches of the vagus nerve." "The stylo-glossus is supplied by the hypoglossal nerve." "The muscles of the soft palate, except the tensor, are supplied through the pharyngeal plexus by the *accessory nerve*."

When deglutition is about to be performed the pharynx is drawn upwards and dilated in different directions to receive the food propelled into it from the mouth. The larynx is raised up behind the hyoid bone and the soft palate is also raised, so that both the larynx and posterior nares are protected against the entrance of food.

"The food when sufficiently masticated is by movements of the tongue gathered up into a bolus on the middle of the upper surface of the tongue—partly raised by the intrinsic muscles and partly by the stylo-glossi—the bolus is thrust back through the isthmus faucium and received by the upper constrictor. By the contraction of the stylo-pharyngeus and palato-pharyngeus, the funnel-shaped bag of the pharynx is brought up to meet the descending morsel, very much as a glove may be brought up over the finger; deglutition is a reflex act—the centre of the reflex act lies in the medulla oblongata. This centre lies at a higher level than that of respiration." (Michael Foster.)

In facial-glosso-pharyngeal anastomosis we may therefore expect, from anatomical reasons, that in the act of deglutition—in which the stylo-pharyngeus and possibly other muscles (which are supplied in part at any rate by the motor element of the glosso-pharyngeal nerve) contract—associated movements would occur in the facial muscles.

Whether such associated movements will be permanent we do not know. Such movements have been observed in one of the experiments only. Three months after a glosso-pharyngeal anastomosis in a baboon, during the act of eating and swallowing, the eyelids on the side of the operation were noticed nearly to close, and the upper lip on this side was seen to be in movement.

Whether the lack of sensation over the posterior third of the tongue, on one side only, will be of importance, we also do not know; but that it may interfere with the protection of the larynx from the entrance of food is possible, for in a baboon in which this anastomosis was done the swallowing of food seemed sometimes to bring on a cough; but this did not happen in other monkeys in which a facial-glosso-pharyngeal anastomosis had been done.

I have done one operation in man in which the facial nerve was anastomosed with the glosso-pharyngeal nerve. It appeared almost a forlorn hope, but it has by no means turned out so; the result so far is encouraging.

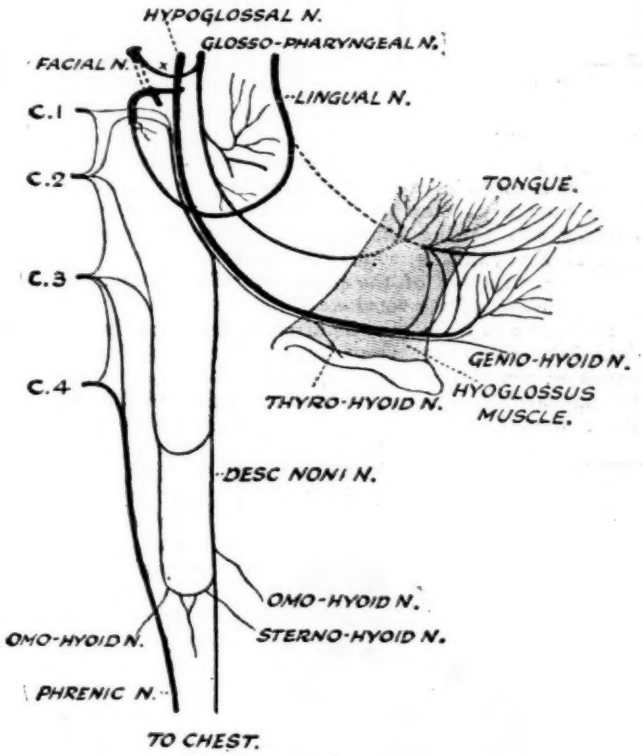

FIG 2.—Diagram of Facial-Lingual anastomosis—end-to-end. ×=ansa of Haller.

CASE.—*Facial-Glosso-pharyngeal Anastomosis: End-to-End.*

Mrs. X, aged 37, was operated on sixteen years ago by a well known aural surgeon for mastoid disease. Since the operation she has suffered from total right-sided peripheral facial palsy. The tears trickle over the face from the right inner canthus. The eyelids on the right side are far apart and mastication is always carried on on the left side of the mouth. The distortion of the face in talking or smiling is very bad. The tip of the nose is bent towards the left side of the face; in fact the patient says it is crooked.

From time to time during the sixteen years of facial palsy treatment of the face muscles has been carried out by means of massage and galvanism. Dr. Lionel Bailey examined the electrical reaction of the face muscles. He obtained a galvanic response in all the right facial muscles except the zygomatici. It was typically sluggish, indicating reaction of degeneration, and was very feeble. There was a slight faradic response in the levator menti and pyramidalis nasi. Dr. Bailey writes: "I do not attach any importance to the fact that a faradic response was obtained in the two muscles mentioned, and consider this was due to overlapping nerve filaments supplying the muscles from the other side of the face. I consider the case is one of complete interruption of the right facial nerve and that no recovery can take place without operation."

The presence of galvanic response in the paralysed muscles justified operation.

March 10th, 1924. The operation of facial-glosso-pharyngeal nerve anastomosis, end-to-end, was performed. The facial nerve trunk was no longer white; it looked more like a strand of reddish fibrous tissue than a nerve.

March 14th. The right face is, if possible, more flaccid—that is, more paralysed—than it was before the operation. I have frequently noticed this phenomenon after section of the facial nerve at the stylo-mastoid foramen in order to unite it to another nerve for the cure of facial palsy. What is the explanation?

April 28th. The tone of the face is remarkably improved. Tears no longer trickle over the cheek. The right palpebral fissure is almost normal. The patient complains of curious crawling sensations travelling over the right side of the face; she says that they make her feel that the face is getting alive again.

June 6th. Slight flicker of movement on faradic stimulation in orbicularis oris at right angle of mouth. The patient could not bear a strong current; in fact, that employed was weak.

June 31st. Dr. Bailey reports: "The galvanic response is more easily obtained in all the muscles, and though still sluggish is much less so than formerly."

July 4th. Further improvement in the tone of the face. There is much less deformity than three months ago. Mastication now takes place by choice on the right side of the mouth. In repose there is little deformity. The nose is now straight, it is no longer bent to the left side. There is *voluntary movement* in the corrugator supercilii, and there is a slight flicker of response to a

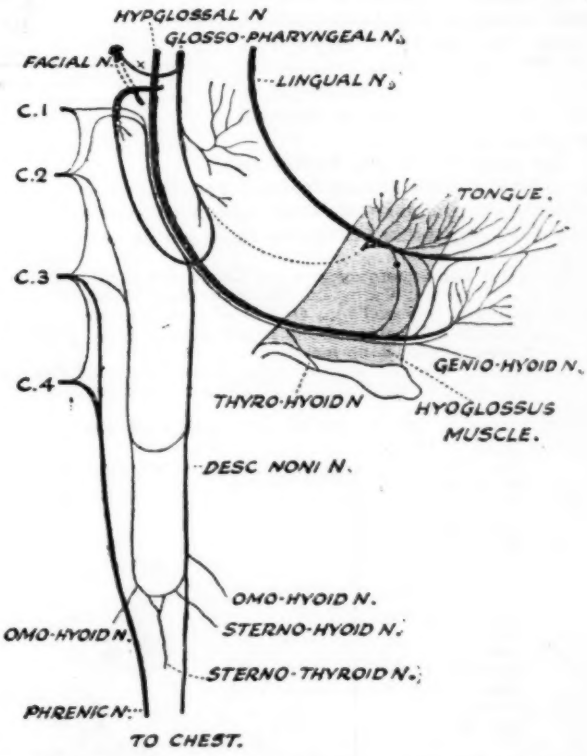

FIG. 3.—Diagram of Facial-Glosso-pharyngeal anastomosis—end-to-end. ×=ansa of Haller.

weak faradic current in the lower part of the orbicularis palpebrarum, and at the angle of the mouth in the orbicularis oris. (It is to be remembered that voluntary movement generally antedates the return of faradic excitability.)

On touching the back of the right side of the tongue gently with a probe the patient felt it at once. The common sensation of the mucous membrane in this region appeared to be as good as that on the corresponding surface on the left side.

On testing the right and left sides of the tongue in the region of the circumvallate papillae with sugar and salt Mr. Colledge and I were unable to distinguish any difference between the two sides. (Note that the connexion of the right glosso-pharyngeal nerve with its lingual branches was severed four months ago.) Is the recovery of common sensation and taste over the back of the right side of the tongue to be explained by overlapping filaments from the lingual branches of the left glosso-pharyngeal nerve?

In this case since the division of the glosso-pharyngeal nerve there has been no difficulty in swallowing, and during swallowing no movement of the right facial muscles has been observed. There has thus been no indication that protection of the larynx against the entrance of food is impaired.

As far as one's knowledge goes at present, the conclusion seems to be that facial-glosso-pharyngeal anastomosis, end-to-end, is the operation of choice to perform in cases of facial palsy.

The Evolution of the Operation for the Cure of Paralysis of the Vocal Cord.

Some time before the war I united the severed recurrent laryngeal nerve to the side of the vagus; but the patient disappeared, so the result of the anastomosis is not known.

It appears natural to employ the vagus for this anastomosis; but one, if not the chief, reason for the failure after anastomosis to obtain a movement of the vocal cord during tranquil respiration, such as was present before the injury to the recurrent laryngeal nerve, is the small chance there is of attaching the recurrent nerve to those bundles of fibres in the vagus trunk which were originally in continuity with it. The difficulty becomes obvious on studying a transverse microscopical section of the vagus nerve (Fig. 5). I have always performed a recurrent laryngeal vagal anastomosis, end-to-side, on the tracheal side of the vagus, but have never seen afterwards a movement of the vocal cord during tranquil respiration.

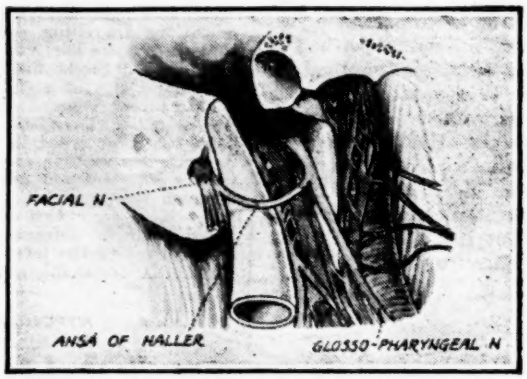

Fig. 4.—"The ansa of Haller" or communication between the facial and glosso-pharyngeal nerves outside the skull. This communication is said to be inconstant. The figure is taken from Testut's *Anatomy*, and Testut borrowed it from Bourgery.

The same result—no movement of the vocal cord during tranquil respiration—has followed recurrent laryngeal-descendens noni end-to-end anastomosis. The following table illustrates these points:

Result of the Anastomosis of the Recurrent Laryngeal Nerve to the Vagus and the Descendens Noni.

1. *Recurrent laryngeal-Vagus* (*end-to-side anastomosis*).
   - 2½ months: Vocal cord no longer slack. It is straight and tense. There is no movement.
   - 6 months: No movement of vocal cord during quiet respiration. On partial asphyxiation slight movement observed which soon ceased.
   - 15 months: No movement of vocal cord during tranquil respiration. On opening the wound and stimulating the vagus above the anastomosis, active abduction of the vocal cord was seen.
   - 18 months: No movement of vocal cord even following partial asphyxiation (attested by Sir David Ferrier and Sir Frederick Mott).
2. *Recurrent laryngeal-Descendens noni anastomosis* (*end-to-end*).
   - 2 months: Vocal cord shows tone; it is straight and no longer looks "cadaveric."
   - 3 months: No movement of vocal cord. Wound opened and hypoglossal stimulated above origin of descendens noni; active abduction of vocal cord observed.
   - 4½ months: On partial asphyxiation vocal cord seen to abduct, but movement soon ceased.
   - 9 months: No movement of vocal cord during tranquil respiration, or after partial asphyxiation.

That the anastomoses in these cases after a certain period were capable of conducting a nervous impulse is clear from—

(1) The result of partial asphyxiation, which caused a temporary abduction of the vocal cord during forced inspiration.

(2) The result of electrical stimulation of the vagus above the site of the anastomosis, and of the electrical stimulation of the hypoglossal above the origin of the descendens noni.

Partial asphyxiation failed to produce movement of the vocal cord at a varying period up to eighteen months after the anastomosis was done. It would appear that though the intrinsic muscles of the larynx were in connexion with a recurrent laryngeal nerve which had regenerated (as seen in microscopic sections), and that a nervous current could pass through the site of anastomosis, yet that the nervous mechanism which produces movement of the vocal cord in tranquil respiration had not been restored. The effect of absence of movement in the muscles of the vocal cord during many months would appear to be the cause of atrophy and shortening of these muscles, so that no movement could be obtained in them after partial asphyxiation; though we may fairly assume that the same nervous current was flowing through the recurrent nerve during partial asphyxiation, which previously was effective in producing contraction of the posterior crico-arytenoid muscle and abduction of the vocal cord.

From two to three months after an anastomosis had been done between the recurrent laryngeal nerve and either the vagus or descendens noni a remarkable change occurred in the appearance of the previously paralysed vocal cord. The inner border of the immobile vocal cord was no longer concave and slack. It had regained tone and had become straight and tense. This recovery of tone in the intrinsic muscles of the larynx may be compared to the gradual recovery of tone in the previously paralysed face muscles, after an anastomosis of the facial nerve, say, with the hypoglossal nerve.

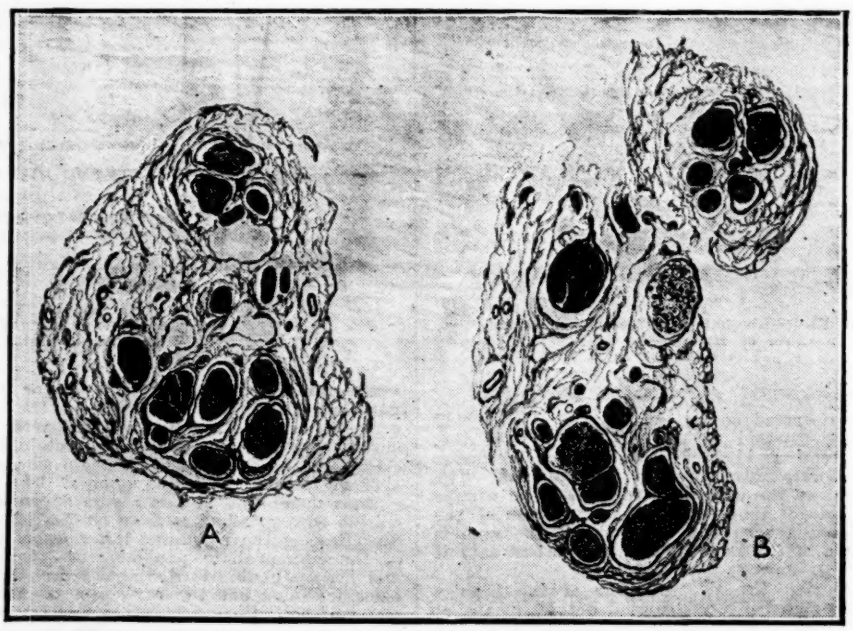

Fig. 5.—Transverse section of the vagus nerve of man, showing: A, The nerve before the recurrent laryngeal is given off. B, The vagus and recurrent laryngeal nerves at the point where the recurrent nerve is separating from the vagus.
In each drawing it is obvious that certain bundles of nerve fibres have fallen out of the sections.

This change in the condition of the vocal cord was demonstrated by Mr. Colledge to Dr. Gabriel Tucker, Dr. Chevalier Jackson's first assistant, and to many members of the International Congress of Surgery which met in London during July, 1923.*

Dr. Frazier of Philadelphia (*Annals of Surgery*, February, 1923), at the instance of Dr. Chevalier Jackson, operated on two cases of recurrent laryngeal paralysis. He anastomosed the recurrent nerve to the divided descendens noni. The first case was operated on in June, 1923, and the second in September, 1923. The result of these

* See *British Journal of Surgery*, vol. xi, No. 42, 1923.

operations, as in our monkeys, has been "the return of tonus and tension in the vocal cord. The crescentic form of the edge of the vocal cord has been replaced by a normal margin. The patient notices a decided improvement, subjectively, in the laryngeal air-way." Dr. Jackson appears to think that a vocal cord which does not move, but which is straight and tense, is better than one which is slack, curved, and cadaveric; in fact, he says it gives a better air-way.

It is to be noted that end-to-side anastomosis of the vagus and recurrent laryngeal nerves is not free from danger, for I did this operation on a baboon in good health. The animal died on the twentieth day of acute lobar pneumonia on the side on which the operation had been done. It is true that the interference with the vagus may have had nothing to do with the death of this baboon, but I cannot get it out of my mind that the operation and the pneumonia which followed were in some way related. I may add that the wound healed by first intention. The animal was anaesthetized with ether.

The failure of the anastomosis of the recurrent nerve to the vagus and to the descendens noni to result in movement of the vocal cord in tranquil respiration naturally led to the search for another nerve which might do so. The nerve to the serratus magnus muscle (the *nerve of Bell*) was considered but rejected, because the serratus magnus only comes into play, if at all, in forced respiration. The *second intercostal nerve* might be brought up through the upper opening of the thorax and anastomosed to an injured recurrent laryngeal nerve; but it was thought that this was a too delicate and difficult operation to find favour with the ordinary surgeon; though the operation possessed this advantage, that the vocal cords move rhythmically with the contractions of the intercostal muscles and the diaphragm in tranquil respiration. Mr. Colledge and I were thus led to consider the phrenic nerve as the most likely to produce the desired effect on the vocal cord when anastomosed with the divided recurrent laryngeal. During inspiration the vocal cord abducts and the dome-shaped lateral muscular parts of the diaphragm flatten at the same time. The movements are rhythmical in tranquil respiration, and depend upon a nervous mechanism which sends an intermittent flow of nervous impulses down the recurrent laryngeal and phrenic nerves.

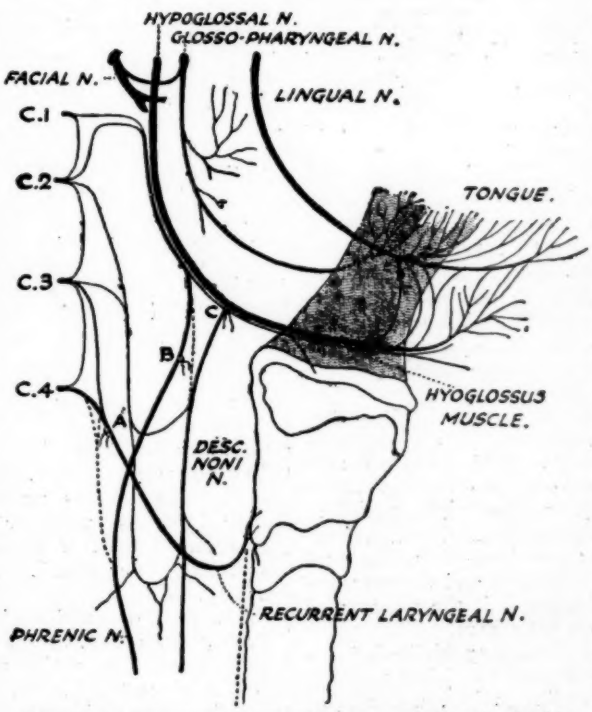

FIG. 6.—A, Recurrent laryngeal-Phrenic anastomosis (end-to end). B, Descendens noni (proximal end)-Phrenic (distal end)—end-to-end anastomosis. C, Descendens noni (distal end)-Hypoglossal—end-to-side anastomosis.

The following is a description of the first experiment in which the recurrent laryngeal nerve was anastomosed with the phrenic. Sir David Ferrier was present.

Recurrent laryngeal-Phrenic end-to-end anastomosis. Descendens noni (proximal end)-Phrenic (distal end) end-to-end anastomosis. Descendens noni (distal end)-Hypoglossal end-to-side anastomosis.

4 months: Both vocal cords move equally in tranquil respiration.

6 months: The previously paralysed vocal cord moves more strongly than the other.

7 months: Excessive, almost violent, movement of the vocal cord as compared with that on the normal side. (Attested by Sir David Ferrier and Sir Frederick Mott.)

Movement of diaphragm normal. (Seen by Dr. Eidinow and Professor Leonard Hill.) Reactions of depressor muscles of the hyoid bone and larynx normal.

You can imagine the feelings of Mr. Colledge and myself when we first saw the movements of the vocal cords taking place in the normal manner, and we knew that the experiment was successful. It was also a remarkable event to observe the half of the diaphragm which had been paralysed contracting again through the nervous impulses passing down the descendens noni nerve.* All three anastomoses were functioning, but by using the whole of the phrenic what had been attempted had been overdone—the previously paralysed vocal cord was working too vigorously. This, however, was not a surprise, because the nerve current required to cause contraction of one-half of the muscle of the diaphragm must be considerably stronger than that required to energize the small intrinsic muscles of the larynx. What root of the phrenic nerve or what portion of the main trunk of the phrenic nerve (the phrenic on transverse microscopic section shows two or three bundles of nerve fibres) is sufficient to cause a normal rhythmical contraction of the muscles of the larynx is a problem which must be left for discussion on another occasion. Suffice it to add that several experiments are in progress to throw light upon this question.

It is not possible to determine with accuracy in a small monkey whether half the diaphragm is in part or completely paralysed by observing the movements of the abdominal wall and costal arches. Dr. Eidinow has made examinations for me by means of the radiographic screen. During inspiration the dome-shaped lateral muscular masses of the diaphragm contract and flatten. At the same time the central tendon descends. In this way the vertical depth of the chest is increased.

When one lateral half of the musculature of the diaphragm is paralysed the central tendon and the two lateral muscles still move up and down in tranquil respiration. The *non-paralysed* lateral muscle contracts and flattens, and its dome-shaped outline loses much of its curved appearance. The *paralysed* muscle of the other side still retains its dome-shaped form, and moves downwards and upwards in inspiration and expiration. There is, of course, no flapping of the paralysed muscle of the diaphragm, as there are no free spaces within the living body; and it is always in close contact above with the pleura and lung, and below with the peritoneum and abdominal viscera.

The experiment described above in which three anastomoses were performed could not be the final settlement of what the surgeon should do when he endeavours to cure recurrent laryngeal palsy. It is too complicated, and what is required is some simple plan of anastomosing the recurrent nerve to the phrenic or one of its roots, so that, if possible, there should be no interference, or the minimal interference, with the function of the diaphragm, and no section of the descendens noni nerve.

Another difficult question arises: Has the exaggerated movement of the previously paralysed vocal cord, which is synchronous with the movements of the opposite or normal vocal cord, been obtained by the perfect linking up of the phrenic fibres with the cerebral mechanism of respiration which previously caused rhythmic and equal movements of both vocal cords? (One must remember that both the phrenic and recurrent laryngeal nerves are intimately associated in normal tranquil respiration.) Or is it simply the intermittent flow of the normal current through the phrenic which had previously energized one-half of the diaphragm, but now is switched over to the muscles of the vocal cord? I am inclined to take the latter view, and if this latter view be true is it possible that, in course of time, Nature will so adjust the mechanism of respiration that the flow of

* It is strange that the descendens noni-phrenic anastomosis should be followed by rhythmic contractions of the diaphragm in tranquil respiration, and yet that descendens noni-recurrent laryngeal anastomosis should fail to be followed by rhythmic contractions of the intrinsic muscles of the larynx. The observation needs confirmation by further experiment.

nervous energy through the phrenic will diminish and lead to movements of the vocal cord in which the excursions will be equal to, and not greater than, those of the vocal cord on the opposite or normal side?

Another question also requires an answer: When the vocal cord is moving normally through nervous impulses conveyed to it through the phrenic, will the patient be able to phonate? This is the question asked by Sir Frederick Mott. The answer can hardly be decided by experiment on the monkey: operation on man will give the reply. This will be the decisive experiment.

The conclusion, therefore, appears to be, that for the cure of recurrent laryngeal palsy and the attainment of normal movement of the vocal cord in tranquil respiration, anastomosis with the vagus or the descendens noni must be rejected, and some form of anastomosis should be carried out with the trunk or with one of the roots of the phrenic nerve.

The Medical Research Council has defrayed the expenses of this research, and given me every possible assistance at the National Research Institute.

THE EFFECT OF DIET ON THE DEVELOPMENT AND EXTENSION OF CARIES IN THE TEETH OF CHILDREN.*

(Preliminary Note.)

BY

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SHEFFIELD.

INTRODUCTION.

It has been found by May Mellanby[1] in her experimental work on puppies, first published in 1918, that the structure of the teeth and their arrangement in the jaws are controlled by the diet and environment to which the animals are subjected during the period of development of their teeth. Some dietetic factors tend to help, and others to hinder, the formation of well calcified, evenly arranged teeth. In the former group are to be found substances rich in a vitamin closely allied, both as regards distribution and properties, to vitamin A. This group of substances includes cod-liver oil, animal fats (except lard), milk, and yolk of egg. Among those foods which lead to the development of badly formed teeth, cereals, and particularly oatmeal, occupy a prominent position. Thus the total influence of a mixed diet on the structure and the arrangement of the teeth in the jaws of puppies is the outcome of a battle between different dietetic influences.

In addition to the influence of diet, May Mellanby[2] has also shown that exposure of the animal to either sunlight or other sources of ultra-violet radiation has, under some conditions, an important influence on tooth formation. It is probable that the effect of these radiations is to make active the calcifying vitamin stored in the body. In fact, the interaction of the dietetic and environmental influences on tooth formation is certainly very close.

Two questions arise from the experimental work on the factors influencing the formation of puppies' teeth: first, Do the same factors control the formation of the teeth of human beings? and secondly, What relation have these facts to dental caries in man?

With regard to the first question, it is not yet possible to state that the results are applicable to man, in spite of the fact that the experimental work was published some years ago. There seems, however, some justification for believing that they are. It may be said also that if the results of this experimental work can be extended to man, a partial answer to the second question is supplied, for if teeth perfectly formed and well arranged in the jaws can be produced in children by feeding them along the lines suggested by the animal experiments, then such teeth will be less liable to caries than if they were imperfectly formed.

Although such a relationship is obvious to some, yet the idea is not generally accepted by dental authorities, because of the supposed fact that children's teeth are in general well formed and yet very liable to become carious. May Mellanby,[3] however, found, when examining a large number of children's teeth under the microscope, that on the whole the more perfectly formed teeth, as evidenced by microscopical examination, were the least carious. There were, however, exceptions to this rule, for out of 302 teeth examined microscopically 11 were carious and yet well formed, while 13 were free from caries although of defective structure. Closer examination revealed that when teeth were well formed and carious any secondary dentine present was usually poorly calcified; and, on the contrary, badly formed teeth free from caries, or in which caries had been arrested, generally had some well formed secondary dentine. It appeared, in fact, that although the formation of the original enamel and dentine was as a rule a good indication of the susceptibility of a tooth to caries, the presence and structure of secondary dentine indicated a second line of defence dependent on resistance set up in the body and particularly in the tooth itself.

These data, obtained by examination of deciduous teeth of children, were further correlated with some experimental results which showed in a few cases that good secondary dentine was formed in puppies' teeth on a "good" diet, and imperfect secondary dentine when they were on a "defective" diet. Thus it appeared probable that in children also "good" diets might contribute to the arrest of decay. On the contrary, diets compatible with the formation of bad enamel and dentine might be expected to offer less resistance to the initiation and spread of caries. It may be noted here that the resistance of the puppies to infective processes generally was found to be closely dependent on their diet—a "good" diet affording them great resistance, and a "defective" diet rendering them more susceptible. Reference must also be made to the claim of McCollum, Simmonds, Kinney, and Grieves[4] and Howe[5] that "caries-like" lesions can be produced in rats and guinea-pigs by diets defective in certain respects.

OBJECT AND CONDITIONS OF INVESTIGATION.

It is evident that the previous experimental work suggested most strongly that dental caries in human beings would be influenced by the small but specific differences in diet above mentioned. It appeared necessary, therefore, to investigate this matter, because corroboration of the animal results and their extension in man to the problem of caries would, if forthcoming, raise this subject from a position of academic interest to one of immediate human utility.

The children under observation were in an institution during the period of the investigation, and their diet and environment generally were under the close supervision of one of us (C. L. P.), by whom the improvement in the health of the children was carefully watched.

Three groups of children were taken. One set (nine in number) were placed on diet (diet A) which included cod-liver oil, milk, and eggs, but no oatmeal. On the basis of the investigations referred to above, this diet, which has a potent effect in bringing about calcification, might be expected to increase the resistance of the body, and especially the teeth, to bacterial infection. The next group consisted of ten patients, who received a diet (diet B) similar on the whole to diet A—the chief differences being that it included oatmeal, very little egg, and less milk than diet A, and no cod-liver oil. The third group consisted of thirteen children chosen from patients on the ordinary hospital diet (diet C). They were selected so as to be comparable with the first two groups in age, duration of institutional treatment, etc.

The diets eaten by the three groups are indicated below, but naturally the quantities varied to some extent with the age of the child.

It will be noticed that diet B, which contains more cereal, including oatmeal, and less calcium and vitamin A, is otherwise not very different from the ordinary hospital diet (diet C), which holds an intermediate position—so far as power to stimulate calcification in puppies is concerned—between diets B and A.

The effect of the three diets on the patients was very carefully watched, and as far as could be observed there was no difference in the improvement of the general health

* The expenses of this research were defrayed in part by a grant from the Medical Research Council and the Dental Board of the United Kingdom, to whom our thanks are due.

TABLE I.—*Daily Diet.*

Diet.	A.	B.	C. (Hospital Diet.)
Milk	2 to 1½ pints	¾ to ½ pint	1½ pints
Bread	2 to ½ oz.	5 oz.	*Ad lib.*
Fat	1 oz. (butter)	1 oz. (margarine except towards end)	1 oz. (margarine except towards end).
Sugar (including cooking)	1½ oz.	3 oz.	1½ oz. and jam, etc.
Oatmeal, groats or gruel	—	2 to 4 oz.	Occasionally.
Rice, tapioca, etc.	½ oz.	½ oz.	½ oz.
Meat (cooked) ...	1½ oz.	1½ oz.	2½ oz.
Potatoes	2 oz.	4 oz.	4 oz.
Other vegetables	2 oz.	½ oz.	½ oz.
Cocoa	Made with milk	Made with water	Made with milk.
Egg	1	Very little	Sometimes.
Fruit, etc.	½ orange, or ½ tomato, or swede juice, 1 or 2 dr.	As in Diet A	As in Diet A.
Cod-liver oil ...	3 to 6 dr.	—	2 to 3 dr.

in the three groups. The condition of the mouth and teeth of each child was charted at the beginning of the dietary and also after some months, the period varying slightly in different cases. The difficulties of correctly recording all the findings are obvious, but we have tried to retain the same criteria throughout.

Hypoplasia.—The general condition of the teeth as regards hypoplasia obvious to the naked eye was noted. A special standard (based on the observations mentioned above) was adopted, and as far as possible used, throughout the investigations.

Caries.—An attempt was made to record the position, extent, and degree of softness and hardness of each carious point in the individual teeth. After periods which varied in the three groups from an average of seven and a half to eight months the teeth were again examined and the results charted. The number of teeth in which new carious areas had occurred since the first inspection and the number of teeth previously carious in which the caries had increased were noted. In addition, an attempt was made to record the amount of hardening or softening of the carious areas. Radiograms were taken at intervals, for it was thought possible that there might be some alterations in the structure and development of the bone surrounding the teeth, of a similar nature to that observed by May Mellanby in puppies.

Histology.—In most cases at the beginning and also after some months of the dietary one or more carious teeth were extracted, mounted in balsam, and ground down so that a microscopic examination could be made. By this means the detailed structure of some of the teeth can be compared with that observed macroscopically. It was hoped also from these sections to get an indication as to whether the diet had had any action on the carious process—such, for instance, as arresting it. This question will be dealt with when the investigation is more complete.

Ultra-violet Light: Saliva.—The action of ultra-violet light together with the different diets is being investigated, but the results will not be referred to in this preliminary paper. C. Lee Pattison is estimating the calcium content and hydrogen-ion concentration of the saliva of these patients. This will also be discussed in a separate publication.

RESULTS.

Before recording the results obtained the following points should be noted:

1. Children were selected for the three groups so that their home environment and diets from birth to admission to hospital were as nearly alike as possible—for example, particulars of the previous diet were obtained from the parents, and, although the value of these data is not great, efforts were made to have the groups as comparable as possible in this respect. In most cases the conditions of the homes were known from the personal observations of one of us (C. L. P.).

2. The average length of time during which patients were on the ordinary hospital diet, before the first inspection of their teeth, was, in months: Group A, 7.5; Group B, 8.5; Group C, 8.5.

3. The average age of the patients at the beginning of the experiment was, in years: Group A, 7.5; Group B, 7.5; Group C, 7.1.

4. The average period covered by the investigations was, in months: Group A, 7.5; Group B, 7.5; Group C, 8.

5. The average amount of dental hypoplasia observed by the naked eye was practically the same in the three groups A, B, and C.

6. The average number of carious teeth in each child before commencing the diets was: Group A, 6.25; Group B, 6.125; Group C, 7.

TABLE II.—*Summary of Investigation and Results.*

	A.	B.	C.
Number of patients in each group	9	10	13
Average time between admission and first inspection (months)	7.5	8.5	8.5
Average age at which diet started (years) ...	7.5	7.5	7.08
Average period covered by the investigation (months)	7.5	7.5	8.0
Average number of erupted teeth per child at first inspection	18.75	19.25	21.0
Average number of carious teeth per child at first inspection	6.5	6.125	7.0
Extension of Caries.			
Average number of erupted teeth per child at last inspection	17.75	18.0	20.5
Actual number of new teeth becoming carious between inspections	6.0	28.0	20.0
Average number of new teeth per child becoming carious	0.65	2.8	1.54
Number of teeth already carious in which caries increased	7.0	23.0	18.0
Average number of teeth per child in which caries increased	0.75	2.3	1.4
Total number of teeth showing new or increased caries	13.0	51.0	38.0
Average number of teeth per child with new or increased caries	1.4	5.1	2.9
Total number of carious teeth in which hardening has occurred	14.0	7.0	13.0
Softening has occurred in	0	4.0	1.0

It will be noted that the average age of the child, the period of investigation, and the dental condition before the first inspection were practically identical—in fact, the only obvious variation in the three groups was in the diet the children received. It is therefore this factor which is probably responsible for the differences observed in the dental changes.

TABLE III.—*Average number of teeth per child showing a spread of caries previously present and new carious areas, together with the main differences in the three diets.*

Diet.	Main Difference in Diet.	Average No. of Teeth per Child in which Caries has Spread.
A.	Abundant calcifying vitamin and calcium; small amount of carbohydrate, *not* including oatmeal	1.4
B.	Less calcifying vitamin and calcium; much carbohydrates, including oatmeal	5.1
C.	Intermediate amount of vitamin A, calcium, and carbohydrates; some oatmeal	2.9

In other words, the tendency for caries to spread was greatest in children receiving diet B, least in those receiving diet A, and intermediate in those receiving diet C.

SUMMARY.

It has been found that when children are fed on a diet which has been shown (by May Mellanby) in the case of puppies to result in the formation of well calcified teeth, then the initiation and spread of caries takes place at a slower rate than in the case of similar children fed on diets not having such potent calcifying activity. The diet giving the best results, besides having the ordinary qualities of a normal diet, is rich both in calcium and the calcifying vitamin, and contains comparatively little cereal, none of which is in the form of oatmeal.

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SOME SUGGESTIONS IN THE TREATMENT OF PUERPERAL SEPSIS.*

BY

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My plea in this paper is for increased effort in combating puerperal sepsis when and as soon as it appears. Organisms may be present in large or small numbers in fragments of placenta, or membrane, or blood clot, and continue to multiply. Very soon, if not there from the first, they enter the endometrium itself, generally at the placental site or around it, and they soon invade its deeper layers. Thence easy entrance to the muscle wall is afforded by venous and lymphatic channels, the former in or around the placental site containing thrombi which supply an ideal culture medium for further multiplication. If the patient has power to overcome the infection the organisms are gradually destroyed *in situ;* if not, the infection progresses, but unless exceptionally virulent it remains in the uterus for some days. In the presence of infection involution of the uterus is never so rapid as normally, and frequently is arrested altogether. In a patient lying on her back, as is usual for the first few days of the puerperium, the uterus with infection deep in its walls is flabby and bulky from arrested involution and quite unable to drain effectively, partly owing to the patient's position and partly to its lack of contractile power. Any discharge which leaves the uterus will be unable to escape freely unless the patient's position is altered. If the infection is not overcome spontaneously it will soon spread along the various channels open, along the deep veins and lymphatics, along the Fallopian tubes, or into the cellular tissues, and so on, and the organisms will gain the blood stream in varying numbers and produce bacteriaemia. Our efforts should be directed, first, to cleaning the inside of the uterus; secondly, to destroying organisms within the uterus; thirdly, to draining a septic cavity; and, lastly, to promoting involution.

My contention is that small, perhaps almost microscopic, pieces of decidua can act as culture media. In a case showing signs of intrauterine sepsis I do not think it matters how complete the placenta, etc., may have been on inspection or to the usual tests, because no one can tell whether minute pieces may not remain. Every effort should be made to remove, with the greatest care and with all possible gentleness, any detritus, however small.

Antiseptics tend to further tissue damage if used strong enough to kill virulent organisms, and therefore provide increased scope for the multiplication of the latter. The efficacy of the new types of antiseptics, such as Dakin's solution, lies not only in the fact that they are used in solutions which are practically isotonic, but that they contain free chlorine, which is a powerful germicide. Their application is continuous, or nearly so, by means of the method described by Carrel and Dakin, modified slightly to suit the structure of the female pelvis. By this means a suitable antiseptic is applied to the infected area, and, what is more, it is continually applied.

Drainage of the infected cavity takes place satisfactorily along the outer walls of the sheaf of Carrel-Dakin tubes as they emerge from the uterus. It is improved by sitting or tilting the patient up in bed and gently washing out the vagina with a simple douche daily. Patients should not only sit up on a bed-pan for evacuation of the bowels, but also upon every occasion upon which the bladder is emptied.

The modified Carrel-Dakin method is as valuable in re-establishing involution as it is in other respects. It will always promote some involution, and it will even do so when the infection has gone beyond the confines of the uterus or even of the pelvis, and when it is going to cause death. One of the most favourable signs, as a general rule, is the expulsion of the tubes about the third or fourth day, and, although it can occur in cases which will eventually prove fatal, it generally shows that a great step towards recovery has been made. If the infection be so severe that involution does not occur, the tubes will remain indefinitely *in situ*. As further aids I sometimes give ergot, pituitrin, quinine, or digitalis, according to the requirements of the case. This is the *basis* of treatment immediately sepsis is established, but before describing technique in detail I will briefly mention the treatment I adopt in the later stages of the disease, where the infection has progressed and the patient shows signs of severe bacteriaemia.

Soon after peptone shock was advocated for these cases by Dr. Gow I began to use his formula for making the solution and his method of administering it (see BRITISH MEDICAL JOURNAL, August 21st, 1920, p. 268). The essentials in giving it are to watch the pulse and the blood pressure and introduce the solution with extreme slowness. Normally it should take from seven to ten minutes to inject 6 to 8 c.cm. The introduction of peptone is usually soon followed by a rigor, but this is a favourable sign. Marked benefit to the temperature and the patient's general state is frequently seen within twenty-four hours. If the high temperature returns or persists, another larger dose is given in two or three days, and so on.

The solution of eusol I have used is, 1 part of the ordinary strength to 5 of normal saline. The injection of 10 to 12 c.cm. intravenously is unattended by the alarming symptoms which may occur with the peptone solution. I have employed it in so few cases that I cannot say of what value it really is. It has, I fear, been rather in the nature of a "last resort" in my cases.

In all cases a culture should be taken from within the uterus with a view to vaccine preparation, but of the use of vaccines I have had very little experience. I understand, however, that generally their use is disappointing. So far blood cultures have without exception proved negative in those cases of mine in which they have been taken. A vaccine prepared from the blood would be expected to be more efficacious than one grown from the endometrium.

Polyvalent antistreptococcic serum has its place in the treatment. There is a tendency for the medical attendant to be content to give one or perhaps two doses at an interval of as long as two days. This is likely to be of no avail. If serum is to be used it must be used frequently and be persevered with. Moderately large doses given every twelve hours for some days will in some cases produce the desired effect.

It is extremely important to make a general examination of the patient, first to exclude any other cause for her symptoms, and secondly to discover the possible presence of lesions secondary to the uterine sepsis—such as pneumonia, pleural effusion, or abscess formation in abdomen or pelvis. The patient is shaved and prepared surgically in the ordinary way, but no douching is done by the nurse. Under anaesthesia she is placed in the perineal position and a copious douche of 1 in 1,500 mercury biniodide given. The vagina is then swabbed dry and painted with a 3 per cent. solution of picric acid in spirit.

An estimate of the size, position, mobility, etc., of the uterus is made by bimanual examination. An Auvard's speculum is introduced and the cervix and vagina carefully inspected for the presence of bruising or lacerations. The os is gently grasped with sponge-holding forceps rather than with a vulsellum, because of its great friability, and a swab culture taken from within. Next, with the greatest care, a finger is introduced and any massive detritus removed. Then with a series of dry swabs of suitable size held by ring forceps the whole cavity is cleaned. A dry swab pushed in and carefully rotated, repeating the manœuvre several times, will remove tags, small clots, coagulated mucus, and the like. A blunt flushing curette is next used and the whole endometrium gently stroked all over, while a stream of double strength saline continually flows. This removes still more fragments and ensures the retention of nothing which has become detached. I used next to swab out the cavity with flavine, but this I discontinued, as flavine forms a thick coagulum with serum and blood, and so tends to prevent the efficient continuous irrigation of the cavity which is to follow. For a similar reason I have never used flavine through the Carrel's tubes.

The cavity having once more been dried with swabs—or

* Abridgement of a paper read before the Cambridge Medical Society.

packed for a short time if there is bleeding, which usually stops very quickly—a sheaf of four Carrel's tubes is inserted. The tubes are specially designed in order that the whole cavity can be kept in contact with the fluid introduced through them. The tubes are then stitched in pairs to the labia majora by a double looped stitch. Before the patient leaves the table each separate tube is tested for patency (as clotting of blood might rapidly obstruct them) by means of saline driven through them by a Higginson's syringe; they are then firmly tied to the glass leads on the connecting tube. The latter is similarly tested with saline. Pads are placed over the vulva and the connecting tube pinned to the binder. I have found it unnecessary to protect the vulva with grease.

A continuous flow of Dakin's fluid is thenceforward kept up if it can be satisfactorily maintained, but I think a better method is repeated copious injections every two hours. Each twenty-four hours while the tubes remain *in situ* the flushing through with saline is repeated, thus ensuring patency of the tubes.

Once a day a simple vaginal douche is gently given in order to wash away any discharge escaping along the sheaf of tubes. By stitching the tubes in pairs on either side to the labia, the meatus urinarius is not interfered with and patients have no difficulty in emptying the bladder. In the majority of cases temperature soon falls and in a day or two regains the normal. Involution commences soon, as is seen by the sagging of the tubes into the vagina; and their expulsion is usually expected in three or four days.

This modified Carrel-Dakin method is equally applicable to cases when sepsis follows abortion at any stage. The same procedure is gone through, and even greater care is taken to ensure the removal of all detritus, which is generally more adherent. It is sometimes exceedingly hard to remove adherent fragments from the wall of the uterus, especially if only one finger can be introduced. I sometimes use paper-sorting finger caps pulled over my gloves for this purpose, though they tend to blunt the tactile sense.

This is the procedure I now adopt in all cases where there is evident uterine sepsis in the puerperium, whether it appears to be very severe or only quite mild—that is to say, I proceed in exactly the same way when the condition commonly known as "sapraemia" manifests itself. I think active treatment in sapraemia of the greatest importance. So-called "sapraemia" may well be the precursor of true septicaemia, and therefore should never be left untreated. The policy of "waiting to see if the temperature falls in thirty-six hours," or "whether a decomposing piece of placenta will come away of itself," I believe to be wrong. No clear distinction exists in the puerperium between so-called sapraemia and septicaemia, or between septicaemia and pyaemia. In all there is probably a bacteriaemia of varied intensity, and in all there is also circulation in varied amount of toxins the products of bacterial activity. One merges insensibly into the other, and it is quite impossible clinically to say where one ends and the other begins. The tendency in the past has been to regard so-called sapraemia as a comparatively innocuous condition, and as a result there has been the tendency to delay active treatment of it. I maintain that so-called sapraemia (by which is generally meant the presence of putrifying material in the uterus) can at any moment give rise to a septicaemia—namely, deep invasion of the uterine wall followed by liberation into the blood stream of much more toxin and many more micro-organisms. Therefore, sapraemia *must* be dealt with as soon as it shows itself. There is even less distinction between septicaemia and pyaemia clinically, but local treatment at this last stage is not of such importance and has less influence on the future course of the disease.

A class of case I have found to be greatly benefited by the modified Carrel-Dakin treatment is that where some slight sepsis has occurred in the uterus, but has not done any harm till the later weeks of the puerperium. These patients show signs of what might be described as "peritonism"—rigidity, immobility, and tenderness of the abdomen, sudden rise of temperature and pulse, with dryness of the tongue, and so on. In many the symptoms resemble acute appendicitis. If examined by the vagina the uterus is generally found to be larger than would be expected at the given period of the puerperium, and there is generalized pelvic tenderness with no localizing signs. These are the cases—namely, very early acute salpingitis—where the tendency is to avoid opening the peritoneum if possible. I have treated two such cases with Carrel-Dakin irrigation, with good results. Under anaesthesia the cervix was moderately dilated, some disorganized blood clot removed, and the tubes inserted. Within a very short time the temperature fell to normal, all acute symptoms subsided, and involution was completed almost immediately. Convalescence was in both cases exceedingly short. Gross conditions such as abscess formation and the like must be most carefully excluded, but in those cases where signs of inflammation localized to any given organ are absent, and when the question arises as to the necessity for abdominal section, careful exploration and irrigation of the endometrium may save the patient a major operation and very considerably speed up convalescence. When an abscess forms in the pelvis its evacuation is, of course, necessary, and if with safety it can be opened and drained by colpotomy I think this is the ideal route.

Gross lacerations of soft parts I treat by means of frequent baths made up of weak solutions of borax or Milton solution. Fistulae into the rectum or vagina, or both, after forcible instrumental delivery are less likely to remain permanently open if from the first means are adopted to avoid excretions of the rectum or bladder from escaping continuously into the vagina. In one of my cases, seen by me on the third day, the patient had not only very extensive lacerations of the urethra, but a utero-rectal fistula also—that is to say, faecal matter could be seen escaping from the os, the communication with the rectum being at the level of the internal os through a tear there. With much difficulty the portions of the urethra were found and a catheter stitched into and along them. Similarly a large, thick-walled rubber tube was stitched into the lower four or five inches of the rectum. Meanwhile cleansing of the uterus was achieved by Carrel's tubes, and perfect healing ensued. This patient also had hyperpyrexia, and the symphysis pubis had been wrenched one inch asunder by the instruments. Pyaemic abscess or effusion is treated by incision or tapping. So far I have failed to get cultures of living organisms from these secondary foci.

This paper is based on thirty cases of puerperal sepsis of different kinds which I have treated during the past few years, mostly at the hospital. I regret to say that they are by no means nearly all, but of these I have complete records and charts. Statistics are apt to be misleading, especially in a disease of this kind, because of the extraordinary variability of the factors concerned. This would certainly apply to mortality rate, especially when the number of cases is comparatively small. But one or two points are worth noting when the series is surveyed. In only seven was labour uncomplicated. In all the others there was one or more of the following:

Forceps or manual delivery in 7; manual removal of the placenta in 8; craniotomy in 3; untreated tears of the vagina or cervix in 4; albuminuria in 2; eclampsia in 2; placenta praevia in 2; post-partum haemorrhage in 2; maceration of the foetus and tertiary syphilis in 1.

Thus in half the total number there was intrauterine interference of some sort, not counting the three in which craniotomy was performed. In roughly a third there were conditions characterized by bleeding and consequent anaemia, or toxaemia and consequent debility.

Here, then, we may be said to have two predisposing causes for the occurrence of sepsis—manipulations during delivery on the one hand, and anaemia or debility at or before delivery on the other. Many cases of sepsis are caused by organisms already present in the patient, and in these debility or anaemia is the predisposing factor in lowering the patient's resistance to the action of those organisms. Similarly, manipulations in a patient who already harbours the organisms will provide the damaged tissue upon which those organisms can flourish. In like manner an unstitched tear will act as a predisposing cause, as it is most likely to become mildly septic if communicating with the vagina or cervix, and by its proximity to the uterus act as a potential cause of infection.

It must always be remembered, however, that manipulations of any kind can introduce virulent organisms into the uterus. It is impossible to sterilize absolutely a vagina, however thoroughly it may be attempted, and many virulent organisms can and do exist and multiply there with no harmful results. But if those same organisms gain access to the inside of the uterus they may do untold damage.

Two of my cases were of that most fatal kind, the acute aplastic type of streptococcal infection. Both had been infected with gonorrhoea, and one had subacute gonorrhoea at the time of delivery. She was also hypermature, had a flat pelvis, and required craniotomy into the bargain.

Summary.

1. When fever appears in the puerperium, having excluded maladies outside the pelvis which may cause it, it is far safer to give an anaesthetic and carefully examine the patient's pelvis than to "wait and see." If intra-uterine sepsis is present, explore the uterus and take steps to empty it or clean it, or both. To wait and see if the fever will subside may mean waste of precious time.

2. A so-called sapraemia is quite often the precursor of the most virulent septicaemia, and anyhow a sapraemia will not be improved by leaving even small and removable fragments of placenta or membrane *in situ*, if they are poisoning the patient.

3. The septic uterus will not involute, but the modified Carrel-Dakin treatment, assisted perhaps by drugs, will help involution better (in my opinion) than anything we have at our disposal.

4. If antistreptococcal serum is to be used, use it frequently until the temperature falls.

5. Further adjuncts are "peptone shock" and intravenous eusol.

6. Take a culture from the endometrium and from the blood, as a vaccine later may be of value, especially if prepared from the blood.

7. Pay careful attention to posture in the nursing of these patients. Fowler's position will aid drainage, whereas the supine position will tend to dam back secretions. Similarly micturition and defaecation in a complete sitting position are useful aids.

8. In early infection of the adnexa, the modified Carrel-Dakin method may possibly prevent the necessity of abdominal section, and will certainly speed up recovery.

9. Where anaemia or debility is caused by haemorrhage or toxaemia keep a special look-out for sepsis.

10. Perform all manipulations or instrumentation with extreme gentleness whenever possible, and practise asepsis most punctiliously.

11. Sew up all tears of soft parts immediately.

Puerperal sepsis is a type of wound infection which will not improve by watching and waiting. Operative measures and certain forms of medication have scope, though still limited, in its treatment. There is no panacea, though we hope it may appear. Until it does, each case will require careful study with a view not only to its own cure, but also to the discovery of a real antidote to this scourge.

OCCLUSION OF THE OS FOLLOWING SURGICAL TREATMENT OF UTERINE AND VAGINAL PROLAPSE.

BY

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Many women are compelled to seek relief for the disability and discomfort arising from varying degrees of prolapse of the vaginal walls and uterus. A pessary is the usual means of initial treatment, but often, after a while, it is found necessary to discard it because either it fails to afford sufficient support, or, if it is composed of vulcanite, its pressure upon the soft parts causes pain and irritation. Not infrequently the patient herself becomes impatient and demands more radical treatment, having learned from experience that a pessary, especially a rubber ring, demands personal attention which becomes irksome as well as several visits annually to or from her medical adviser.

In the event of any of these circumstances occurring surgical treatment can with confidence be advised in the majority of cases. It is now almost universally realized that plastic operations upon the perineum, the vaginal walls, and the cervix of the uterus are sufficient in the great majority of women to afford relief and ensure comfort. The strenuous advocacy for many years of Fothergill and others has resulted in their theories having been accepted and their method of treatment adopted by the great majority of gynaecological surgeons.

As a routine step in the operations, amputation of the cervix is nearly always performed, as it is followed by great benefit in more ways than one. The cervix in conditions of bad prolapse is so often extensively lacerated, eroded, and ulcerated that it is a constant standing source of disease, and, at middle life, a menace as a likely seat of cancer. The purulent discharge which has its origin in such a cervix is a fruitful source of local irritation and discomfort, while the absorption of the toxins is responsible, in my opinion, for much ill health, the prime cause of which is frequently unsuspected. Removal brings about cessation of the discharge, and, in addition, tends to relieve the congestion and to lessen the weight of the generally enlarged and heavy uterus.

Caution, however, must be exercised in the performance of this simple operation, should the patient be of parous age, or her last condition may be worse than her first. I have seen several examples of repeated abortions subsequent to operation, caused without doubt by too high amputation of the cervix, and the following history of the yet more serious consequences which may result from an operation for prolapse in a woman before her menopause seems to be worth recording as a reminder that zeal must always be tempered with discretion.

A multipara, aged 42, who had suffered for several years from a moderate but gradually increasing degree of prolapse, chiefly of the vaginal walls, consulted a well known and esteemed gynaecologist during the absence from home of her usual medical attendant. She was ordered into a nursing home, where, apparently, the operations of anterior and posterior colporrhaphy, amputation of the cervix, and perineorrhaphy were performed, and in two to three weeks she was again at home.

Shortly afterwards attacks of abdominal pain began, at first mild and soon passing away, but gradually becoming more severe until at last they were agonizing enough to call for a hypodermic injection of morphine. Between the attacks the patient was fairly well and was able to go about, but, six months after the operation, she was seized with an attack of such unusual severity that it was considered necessary to have a consultation.

The foregoing history was told to me, and I learned further that menstruation had not appeared since the operation, although it had previously been regular. During the attacks there had never been a rise of temperature. The patient was well coloured and stout. On making a vaginal examination it was found that the operations had successfully effected the formation of a restored perineum and of a normal vaginal canal. The vaginal vault was devoid of any trace of a cervix, its place being taken by a firm cicatrix. Abdominal examination revealed the presence of a tense pyriform swelling, evidently the body of the uterus, rising mesially almost to the umbilical level. Upon questioning the patient the fact was elicited that the pain from which she suffered came spasmodically and reminded her of labour pains.

The diagnosis was apparent, and a day or two later I performed hysterectomy and double salpingectomy. The walls of the uterus were greatly thickened and its cavity contained large quantities of thick blood of a dark brown colour. No trace of the internal os could be found—the cavity was entirely shut off; stenosis was complete. The Fallopian tubes were greatly distended by the same thick chocolate-coloured fluid as was in the interior of the uterus.

No other treatment could have been attempted with any hope of success. Obviously, serious obstacles and dangers which readily occur to one's mind and need not be mentioned would have militated against a good result from any attempt to open up the uterus from below. The patient having children and being 42 years of age, there was all the less objection to hysterectomy being performed. She has remained in good health and has had no pain eight months after the operation.

A too thoroughly radical removal of the cervix in a woman of child-bearing age may therefore be, as this case proves, a dangerous proceeding in the surgical treatment of prolapse, leading to stenosis which may occlude completely the canal at the internal os and so cause retention of menstrual blood.

British Medical Association.

PROCEEDINGS OF SECTIONS AT THE ANNUAL MEETING, BRADFORD, 1924.

SECTION OF DISEASES OF CHILDREN.

LEONARD FINDLAY, M.D., F.R.F.P.S., President.

DISCUSSION ON PULMONARY TUBERCULOSIS IN CHILDHOOD.

OPENING PAPERS.

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THE CLINICAL ASPECT.

A STUDY of the Registrar-General's reports reminds us that there are two periods of life during which tuberculosis tends to assume a serious and fatal aspect—namely, the periods of infancy and of early adult life. But what of that period between, of which the Registrar-General has so little to say—roughly, the period of school life: Has the tubercle bacillus forgotten to claim these victims, has it retired vanquished, or is it only digging itself in for further onslaught? It is to intrathoracic and pulmonary tuberculosis in this interesting period of comparative exemption, roughly covered by the ages of school life, 5 to 15, or thereabouts, that I wish to call your special attention to-day, and elicit your views on some of the problems it unfolds.

What does the Registrar-General actually say about pulmonary tuberculosis during school life? He tells us that but 3 per cent. of the deaths at all ages are attributable to this ten-year period—certainly a notable freedom from fatal disease. But if there are deaths there must also be recoveries, and we ought to hear something about these. Or, once again, can it be that the tubercle bacillus has forgotten the children of school age and that only those few that die have been infected? In either case we must ask—what has become of pulmonary tuberculosis at school age that it can be possible for certain physicians to hold the view, and hold it with fair impunity on account of the low death rate, that the disease does not exist? This is the problem we need to unravel.

INCIDENCE OF INFECTION AND DISEASE.

First let us dispose of any doubt that tubercle infection is missing at these ages. The tuberculin tests, applied to modern communities, give the following answer:

	Edinburgh (McNeil).	Vienna (von Pirquet).
Under 1 year	14.1 per cent.	5.1 per cent.
1 to 2 years	29.9 ,,	22.4 ,,
3 to 4 ,, ...	46.6 ,,	37.9 ,,
5 to 6 ,, ...	28.8 ,,	62.3 ,,
7 to 10 ,, ...	51.9 ,,	59.6 ,,
11 to 14 ,, ...	55.0 ,,	73.8 ,,

These are for the von Pirquet test alone—higher figures than these are obtained (as by Hamburger) by a combination of tests.

Next, as to structural lesions, in other words disease, discoverable *post mortem* during these early years of life. Some modern figures, derived from ordinary *post-mortem* material, are the following:

	Müller (Berlin).	Hamburger (Vienna).
0 to 1 year	12 per cent.	15 per cent.
1 to 2 years	30 ,,	42 ,,
3 to 4 ,, ...	45 ,,	59 ,,
5 to 6 ,, ...	50 ,,	60 ,,
7 to 10 ,, ...	40 ,,	64 ,,
11 to 14 ,, ...	75 ,,	77 ,,

98 per cent. of Hamburger's cases had tuberculosis of the bronchial glands.

Clearly, it is not for want of tubercle infection, or even of tuberculous lesions, that fatal tuberculosis is uncommon at school age; it must be that a notable immunity exists during this period of life. But among such material—infected but resistant—there must surely, in addition to a few deaths, be numerous cases of disease running a more benign course and ending in recovery. Both radiographic and *post-mortem* records show that it is so. Opie found that "in one of nine adults *x*-ray plates disclosed such extreme calcified tuberculosis of the lung and its lymph nodes that a grave infection must have existed at some previous time." This was confirmed by autopsies over a large material. "In more than one in every ten individuals the calcified lesions present in the lung at autopsy show that the individual has suffered with widely disseminated tuberculosis of the lung and massive tuberculosis of the adjacent lymph nodes." Mark especially the "massive tuberculosis of the adjacent lymph nodes"—this was no apical tuberculosis of the adult! Are not these the cases for which we are looking, viewed from the standpoint of the *post-mortem* room?

How do these cases show themselves clinically? To those that hold the view that pulmonary tuberculosis does not exist at school age they do not, I think, show themselves at all. Those of a more inquiring turn who recognize that such cases exist, and are not satisfied that they should do so unrecognized and unrecorded, have, or think they have, in their searchings found the "lost tribe." They have discovered a type of child who to careful observation presents certain fixed characteristics. His symptoms are fairly representative, and, on due investigation, he presents certain characteristic physical signs. On suitable treatment, and even without treatment in many cases, the children giving these signs and symptoms for the most part recover, but certain of them get worse and die, and when they die it is of acknowledged pulmonary tuberculosis. On these grounds it is fairly claimed that those which recovered were also suffering with pulmonary tuberculosis, but of a slighter grade.

THE TUBERCULOUS CHILD.

Let us look a little more closely into the points whereby this type of child may be recognized. His symptoms may be shortly dealt with—"a history of frequent coughs and colds, attacks of unexplained fever, loss of weight, anorexia, and asthenia"—so I saw them tersely stated in a recent article, and we may let them go at that. Only I would add that in the hospital class malnutrition is often the most striking feature, while among more prosperous children, subjected to strenuous school games, unexplained attacks of fever, often with cough and vomiting, more often bring them to the physician.

And now for the physical signs: these are, as I said, characteristic, but they do not include any notable stethoscopic signs. And so it happens that the man with the stethoscope finds nothing, and passes the chest as healthy, whereas the man who taps with his fingers is aware of certain abnormalities, and says, "This is not a normal chest." A right-sided paravertebral dullness is the hallmark of the tuberculous child, and the diagnostic value of this sign is as good, in my opinion, as are the apical crepitations and impairment which mark a tuberculous infiltration in phthisis of the adult. It is, moreover, quite as easy to detect as these latter signs, in most cases easier, and I have never had a house-physician who could not learn to find it for himself when he was shown how. For this it is necessary not only to compare this area with the same area on the opposite side, but also with the lung on the same side around the area of impairment. Thus we avoid the error likely to arise if there is also, as sometimes happens, a left paravertebral dullness also. The area has a well defined crescentic edge, and by percussing from without inwards it is quite easy to mark this out. Nevertheless, we hear talk about the difficulty of detecting loss of resonance in the interscapular area; you may take it from me that this is mere nonsense, and I do not advise you to be frightened by it. Paravertebral dullness as found in the tuberculous child is as easy to detect and to demonstrate as any chest sign known to us, and it is only not found because it is not seriously looked for.

Now it is not seriously looked for, by certain physicians at least, because it, or its significance, is not believed in. I cannot help thinking this is attributable in part to the

false view once held that the dullness was due to gland masses or other gross tuberculous lesions. We must disabuse our minds of this error, and accept the paravertebral area of impairment as a mere surface reflection of distant changes around the lung root. We are not, when we find it, mapping out areas of disease, nor must we expect the *x*-ray picture to give any corresponding shadows. The area is probably due to lung shrinkage round the root associated with a partial collapse. It is always associated with a slight loss of resonance over the whole lung, and may be simulated, as a temporary condition, by postural underexpansion of a lung. My own observations make me think it due to pressure of enlarged bifurcation glands on the right branch of the pulmonary artery—in any case it simply implies glandular enlargement, and, though this may be due to various causes, tubercle is by very far the commonest.

Now I advise you to think, when you find a right paravertebral dullness, provisionally at least: "This is a tuberculous child!" Also, where you do not find this sign be very wary of diagnosing intrathoracic tubercle—very few are the tuberculous children in whom this sign is absent. On the other hand, do not imagine that it is present in the healthy, for this is not the case. It may be found, it is true, in some children apparently robust, but so may other undoubted evidences of tuberculosis. Moreover, these chest signs in tuberculous children persist long after the disease which produced them is quiescent. They do not therefore by themselves speak for active disease. The question of activity must be decided on symptoms, and not on physical signs.

Having found a right paravertebral dullness, and mentally noted tuberculosis as a probable cause, we naturally then review all the other signs associated in various degrees of frequency with these cases. These I shall here pass over to leave time for other matters. What I now wish to insist on is the fact that with a right paravertebral dullness, and with no other sign present, we may yet be dealing with a serious case of tuberculous lung disease in the child. Because we hear no crepitations with the stethoscope we must not therefore suppose that lung disease is absent or quiescent. Only in the latter stages of progressive disease do localized crepitations, evidence of surface infiltration, appear to the stethoscope in these cases. On the other hand, it must be noted that general râles due to bronchitis are not infrequent in mild glandular cases, and these must not be mistaken for the signs of generalized tuberculous disease. In addition, apical phthisis of adult type is sometimes found in older children, but these cases I am omitting from present consideration.

The Primary Complex and its Sequelae.

Now, although the stethoscope reveals nothing, yet the *x* rays may show extensive disease, and since such disease is commonly most marked around the hilus region it is convenient to speak of it as "hilus tuberculosis." We may do so, I think, without thereby committing ourselves to any opinion as to the origin or mode of spread, but the matter is of such great interest that I think we should devote some of our time to its consideration.

Let us review, therefore, some of the points which appear to bear upon it. Let us presume that the child has already received his "first infection," reacts to tuberculin, and possesses the local and glandular lesions so well described by Anton Ghon, and termed by Ranke the "primary complex." This consists, typically, when it occurs in the pulmonary area, of a single lung lesion, and caseous disease in the corresponding lymph glands at the hilus, often with involvement of "bifurcation" and tracheobronchial glands on the same side, with spread, in some cases, to those of the opposite side. This march of events corresponds to the first phase of "Koch's phenomena," where tubercle inoculation of healthy animals led to an indolent ulcer with little reaction at the point of inoculation, and marked disease in the corresponding lymph glands. Koch's further discovery was that reinoculation led to severe "reaction," with development of a local lesion proceeding to caseation and softening, but afterwards healing, and with no secondary involvement of lymph glands. The virgin soil had become what has been termed "allergic."

Now the primary inoculation follows of necessity the normal channel of lung invasion, and we had best be clear what this is. The bacilli will travel outwards into the lung by air passages or blood; from these they will, if arrested, pass into the lymphatics, and thence with the normal lymph flow back towards the hilus. Recent work has demonstrated that the blood and air passages are but channels of conveyance, and that the development of the tubercle occurs in the lymphatic system outside their walls.

Our school child is, now, presumed to possess a "primary complex" in the pulmonary area—he is becoming "allergic," but is perhaps not yet fully so. What is the next stage of the process? Presumably, if disease progresses, it will do so for a time in the glands; these will become further involved and form larger masses, and it is from these that we derive the physical signs indicative of intrathoracic tuberculosis. The lungs give no surface signs, but a radiogram may now reveal a mottling around the root on one or both sides. How has this mottling arisen?

How Disease Returns to the Lung.

Now it is not the "primary complex" we are looking at. This consists, nearly always, of a single small peripheral lesion, often out of sight of the *x* rays, whose lymphatic path to the root is but a narrow one. How, then, has disease spread again from the glands into the lung? There are, indeed, various ways in which it might be achieved.

First, there is spread by continuity, a process which is very real, but cannot of itself accomplish any wide dissemination. But in this connexion it must be noted that the "spatial relations between channels of communication—vascular, lymphatic, and visceral—are microscopic, and the new formation must very quickly come in contact with these" (Krause). So that a limited spread by continuity may, once the lung is involved, open the door to other modes of spread.

Secondly, there is the trachea or bronchus, but the rupture of caseous root glands into these is only an accidental occurrence and may be dismissed from immediate consideration.

Thirdly, there is the blood stream, and Ghon favours the probability of a haematogenic invasion. The primary focus, he says, may become latent, "sooner or later to give rise to an endogenous reinfection which usually has its source in the lympho-glandular components of the primary complex, and it can propagate in the regional lymphatic system until it breaks into the blood stream. In the case of primary pulmonary infection it is no rare form of reinfection." Let us inquire what would in this case happen. Whether the bacilli journeyed by normal lymphatic channels into the subclavian vein, or by rupture within the glands into bronchial venous radicles, they would pass to the heart, and thence to both lungs indiscriminately. Those that were there arrested would, as has been found to happen, pass into lymphatic vessels, and again return by these towards the glands, provided any passage for return was open. Such foci of disease as they might initiate would tend to be scattered, but would probably be especially concentrated, as has been found to occur, along the peribronchial lymphatics. This presents a picture which we may find in some cases, but it is not, I think, typical of hilus tuberculosis.

There remains another channel of spread, but one which is only available under conditions of disease—namely, a lymph stream blocked, as is this, by caseation of its draining glands, and therefore tending to overflow its valves, and change or reverse its normal direction of flow. Even Dunham, an opponent of the conception of outward spread, seems to allow its feasibility. "The blocking of the lymph flow towards the hilum is clearly shown," he says, "in tuberculous lungs. It is a frequent observation to find dilated pleural lymphatic vessels over a lesion within the lung, and on section to find that pressure on the lymphatic vessels running towards the hilum has caused the lymph flow to seek out the collateral route towards the pleura. The engorgement of the peripheral lymphatics may be brought

about either by a blocking of the central lymphatics, or by an overflow of exudate." Here, surely, are conditions which would permit the carriage of tubercle bacilli outwards from the diseased glands into the lung. It is a mode of spread which even the morbid anatomist has sanctioned. Tendeloo stresses especially the respiratory suction set up in the distensible lymphatics of the outer parts of the lung, as opposed to those of the less mobile root area, even apart from lymphatic blockage.

Radiographic Evidence.

What evidence do we get in the matter from *x*-ray examination? There may be seen but a heaviness and widening of the upward and downward "strands," suggestive of peribronchial and perivascular thickening, but with nothing to suggest its tuberculous nature or how it has originated. But often the appearance is one of mottling around the root, and most typically of a fan-shaped area of disease extending out towards the axilla, but leaving, on account of its shape, both apex and base free of shadowing. How, but by lymphatic reflux, can we explain this distribution of disease? It might be, perhaps, that in some cases the perihilar shadows were those of embedded pulmonary glands infected from the periphery. In a few, also, it is conceivable that a bronchopneumonic process set up by aspiration of gross particles, as from a softened gland opening into a bronchus, might concentrate itself about the central portions of the lungs; but such instances can hardly cover the ground of hilus tuberculosis.

A lymphatic backwash into the lung is very tempting as the explanation of the majority of them. In cases, moreover, where the appearances are those of heavy root and thickened upward strands with mottling around these latter, it may well be—and the absence of surface signs seems to support it—that here again lymphatic backward spread is at work, and that bacilli are carried out from peribronchial lymphatics by increased suction of the surrounding lung tissue. This appears to me much more probable than "droplet infection" in such cases.

What now do we see, typically, when we turn, radiologically, to the surface infiltration characteristic of apical phthisis of adult type? Here the *x*-ray "fan" is based on the pleura and appears to spread back into the anatomic compartment bounded by the connective tissue layers around it. Leroy Gardner demonstrated that in healthy guinea-pigs infected through inhalation the tubercles, and later a cellular infiltration, develop just below the pleura as in apical phthisis, while the primary lung lesion in childhood, of necessity either a respiratory or blood infection, is found at the surface of the lung in nearly all cases. These, the antithesis to hilus tuberculosis, present a subpleural sowing, with return of disease towards the centre—they illustrate the bounds imposed by normal anatomy, whether in a virgin or "allergic" soil, on infection arriving from without.

So much for the radiological findings and the interpretation to which I hold they lend themselves. But still more strongly is this interpretation supported by clinical observation. In the case of perihilar disease, whether in the child or in the adult, we find no surface signs as we should surely do if disease had spread inwards, as we may admit that it tends to in apical phthisis, from the periphery. Even the "virgin soil" of Gardner's guinea-pigs was able to produce a surface infiltration, and Dunham's stand on the extensive exudate of the "allergic soil," as explanation of surface signs in the adult and their absence in the child, seems to me an insecure one. Surely any peripheral infiltration, if it existed—and it would have to be widespread to supply the lesions of perihilar disease—would reveal itself to the stethoscope.

Résumé of Theoretical Considerations.

And now let us briefly review the assumptions I have put before you with regard to pulmonary tuberculosis as it occurs, when it does occur, in the school child. I would suggest that its characteristics are conditioned partly by the method of spread—for the most part through blocked lymph channels backwards from diseased glands, and partly by peculiar tissue reactions in a soil becoming "allergic," but not yet fully so. This partial allergy may, indeed, itself constitute the protection of school age, apart from any concomitant immunity, since it appears to favour a repair unaccompanied by the disastrous cavitations of adult disease. This tendency to softening may be seen sometimes in later childhood, whether with deep-seated disease or with disease of apical distribution, and in either case surface infiltrations soon develop from "droplet" inhalation.

Now these assumptions seem to carry with them the corollary that apical phthisis of adults owes its peculiarities to other modes of infection—namely, by the respiratory (and possibly the blood) channels (and hence a re-infection "from without" in most cases), conditioned by the special reactions of a fully "allergic" soil. I do not gainsay this deduction, but it is not germane to our present discussion. And this is just as well, since the evidence is not yet strong enough to support this tempting theory.

The Radiogram of Childhood and its Interpretation.

But too often, where there are clinical signs suggesting pulmonary tuberculosis and the *x* rays show but slight shadowings, it may only be possible to affirm that the radiogram is "consistent with a diagnosis of hilus tuberculosis." In infancy the shadows of disease fall on a comparatively clean surface, but in a child of 10 or 12 years the normal radiogram often shows considerable, and perhaps suspicious, shadowings. How far these are due to silicosis from dusty streets, to carbon deposits from the air, or are the result of measles, whooping-cough, and other infective fevers, which were held by an American committee of investigation to thicken the linear lung shadows, and how far they may be due to occult or healed tuberculosis in the apparently normal child, is a question which has much vexed the minds and tempers of investigators during recent years. As a result of the constant study of radiograms from my patients I have myself become much less afraid of tubercle, both as a disease and as a diagnosis, than I used to be. It is no uncommon thing to find the indications of extensive slight or healed disease in unsuspected parts of the lungs in cases of manifest tuberculosis, and when one sees similar appearances without this corroborative evidence of its tuberculous nature one is at least duly impressed. What, after all, is the lesson which increasing knowledge of tubercle and its distribution has been dinning into our ears ceaselessly, year after year, if not the wide dissemination of the seed both in the diseased body and in the community? The more we study the matter the more, I think, we must be impressed with the importance of the soil, and be prepared to accept the presence of the seed almost as a *sine qua non*. The question should surely be no longer, "Is he tuberculous?" but rather, "How much is he tuberculous?" And even in this we may be thinking less in terms of the seed (that is, the extent of the sowing) than of the soil (that is, the resistance as shown in the type of disease and its behaviour). Let the balance tip well on the side of immunity, and we need not be over-anxious as to how many tuberculous foci had been thrown into the other scale. All the evidence shows us that tuberculosis is a very curable disease.

The Problem of the Tuberculous School Child.

Let us get back to our school child, with his paravertebral dullness and his perihilar shadowings, and see what becomes of him. In actual practice he constitutes a problem that harasses the school medical officer and the tuberculosis officer alike. He has been fully recognized in the school service, he is a familiar at the tuberculosis dispensary, but neither body is quite decided what, in fact, ought to be done with him. Those that ignore him will have a few deaths to their discredit, for he has the bad habit of sometimes getting worse and dying of this disease. This, it must be admitted, is uncommon. As a rule, under any possible hygienic excuse, he will get well, or at any rate get no worse. The trouble is that it is so difficult to tell in the earlier stages what is going to be the course of his disease. From physical signs, apart perhaps from *x* rays, it is impossible to decide, and only the symptoms and the course of the case will reveal the issue. For this reason he crowds the dispensaries and fills

the open-air schools, and even lies in sanatorium beds under the county council scheme until such time as he can make up his mind which road, whether the upward or the downward, he has decided to take.

For purposes of discussion I would now suggest to you some of the problems which hang around this tuberculous or subtuberculous school child. First, his very existence seems to be ignored in some quarters, and I hope this discussion will help to establish it. Next, given his existence, comes the detection and diagnosis of his disease, and following that the peculiar characteristics of pulmonary tuberculosis in childhood, and the points wherein it differs, both clinically and pathologically, from apical phthisis of adult type. These I have myself tried to outline, and they present an interesting problem indeed. Further, there remains the question of prognosis in the individual case, none the less difficult because the majority recover readily. In addition there is the question of what is to be done with the subtuberculous child from the administrative point of view, both in the interests of the child himself and of the community.

Finally, there remains the very important and interesting question of what eventually becomes of him, particularly on his emergence into adult life. Does he recruit the ranks of phthisis in the adult, or is he, as some believe, peculiarly immune to further tuberculous disease? Or are there, perhaps, cases which are protected by their childhood disease, and others in which it has got so firm a foothold as again to become active in the guise of a hilus tuberculosis of adult life? These, among many, I would put to you as suitable problems for discussion within the limits of our subject-matter.

II.—D. CAMPBELL SUTTIE, M.B., Ch.B.Glas.,
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THE RADIOLOGICAL ASPECT.

Incidence of the Disease.

In the experience of the department pulmonary tuberculosis is comparatively uncommon and invariably fatal in children. The majority of those affected die in hospital, and compared with adults the duration of the disease is short, rarely exceeding a year, and usually lasting but a few months.

The diagnosis of the disease is based on: (1) the appearance of the typical radiogram; (2) the presence of tubercle bacilli in the sputum; (3) the pathological and histological report of the sectio.

The Technique Employed.

A. *Apparatus.*

Induction coil (16 inch spark) with 40-45 ampères in primary circuit at 250 volts.
Wehnelt electrolytic break (3 point).
Time switch which will give exposures of approximately 1/30 second.
Gas tube of about 3 inch equivalent gap—25 to 30 ma. in secondary circuit.
Six high tension rectifiers in series to suppress the inverse current.
Kodak "superspeed" films.
Two intensifying screens.
Tank development.

B. *Positions.*

1. *The vertical position*, however useful it may be for demonstrating pyopneumothorax, etc., is not easy to arrange. The patients are critically ill and are exhausted by the change of posture; the necessary restraining bands throw shadows on the film; and differences in the apparent opacity of each lung may be produced by the unequal chest expansion due to the lateral spinal curves, which also cause displacements of the mediastinal and heart shadows.

2. *The postero-anterior horizontal* with tube below has the advantage of being less terrifying and allowing a preliminary screening; but the disadvantages far outweigh these, for proper apposition and immobilization of the cassette is very difficult to secure, and it is almost impossible to time the moment of exposure as the upper portion of the child's body is hidden, and also cases with retraction of the head cannot be immobilized in a correct antero-posterior position.

3. In consequence of the foregoing difficulties, the *antero-posterior horizontal* with the tube above was adopted and standardized as follows:

Distance of anticathode from cassette, 24 inches. Tube centred 1/2 inch below the jugular notch on the manubrium sterni. The patient is placed with his back on the warmed cassette, the knees are raised on sand-bags, and the legs and arms immobilized by the same means. If the head is retracted a cassette raised by a sand-bag and with a deep notch in its upper border is used; the occipital portion of the head enters this notch and this allows the neck and upper dorsal region to come into good apposition.

The technical difficulties may be summarized as follows:

1. To make the exposure with such rapidity that all shadow outlines are clean cut, the brevity of the permissible time interval may be appreciated by the fact that pulse and respiration rates of over 150 and 60 respectively are not uncommon, and to these may be added an extreme degree of restlessness. To minimize the latter, ether sprinkled on the abdomen allows an exposure to be made during the respiratory spasm so induced.
2. To secure satisfactory apposition of cassette.
3. To obtain true antero-posterior views.

The interpretation of radiograms is rendered fallacious by errors in technique or by the shadows of lesions being suppressed or distorted by faulty positions or by body movements.

The Diagnosis of Tuberculosis.

This is the disease in which the radiogram gives accurate pictures of small peripheral and larger central lesions which have reached the stage of consolidation or cavitation, before the corresponding clinical signs can be detected.

The progression of the disease is evidenced by the increasing opacity of the abnormal shadows, their spread in extent, their edges becoming less distinct owing to surrounding consolidation, the signs of cavitation in their centres, and by the appearance of abnormal shadows in the other lung.

Types of the Infection.

The following are the types of tuberculous infection from the radiographic view-point:

1. Miliary tuberculosis.
2. Bronchopneumonic tuberculosis (Types A, B, and C).
3. Hilum tuberculosis.
4. Chronic phthisis (adult type).

1. *Miliary Tuberculosis.*

The chest is normal in contour, there is no flattening of the ribs, and no exaggeration of the normal costo-vertebral angle. In adults suffering from phthisis the heart is frequently abnormally small and centrally situated. The mediastinal shadow is not increased in width and it seldom shows shadows suggestive of enlarged caseous glands. The apices and lung parenchyma generally are clear; the hilum shadows are not more prominent than those found in supposedly healthy children, and the levels of the diaphragm are normal as regards the chest and one another; yet despite these negative *x*-ray findings, on *post-mortem* examination there may be miliary tuberculosis present throughout the lungs with enlarged mediastinal glands. I do not think that tuberculous glands show radiographically unless they have passed the stage of congestion and enlargement and have become caseous or calcareous. This contention is supported by the fact that enlarged cervical glands (where the relatively smaller bulk of other tissues allows a much clearer differentiation of the soft tissues) cause very light shadows, and any marked opacity is due to abscess formation, caseation, or calcification. (In this connexion it may be of interest to note that calcareous mesenteric glands have not been seen in children under 5 years of age.)

2. *Bronchopneumonic Tuberculosis.*

Type A.—I have not seen this in the initial stages, possibly because its spread is so rapid. The clinical history is short and is one of a rapid wasting after a recent attack of either respiratory or infectious disease. Frequently clinical examination is negative. On *x*-ray examination the typical picture is seen. The chest is not abnormal in outline, nor have the ribs the "fallen-in" appearance seen either in the chronic type or after long-standing pleurisies or empyemata. There may or may not be widening of the median shadow, but the hilum shadows are almost invariably increased and the whole field of both lungs is dotted with rounded, sharply defined areas of opacity almost all of the same size and equally distributed. The size of each of these shadows varies with each case, from about 1 mm. to 3 mm. in diameter, but their uniformity in extent and depth of opacity is striking. They do not seem to coalesce until the individual lesion exceeds 3 mm.; thereafter over large areas of lung dense shadows are produced, followed immediately by appearances indicative of cavitation. The explanation of this picture depends on the fact,

substantiated by histological examination of individual tubercles, that round each area of consolidation is a zone of local emphysema. By the aggregation of these surrounding zones the penetrability of the parenchyma to the rays is so increased that the shadows of the consolidation of all areas (except those nearest the film) are obliterated, and only these latter produce sharply defined shadows, by reason of their proximity and the afore-mentioned emphysematous zones, otherwise it is difficult to understand why the superposition of the shadows of so many opaque areas does not produce the appearance of massive consolidation. Further, this surrounding emphysema masks the condition and renders the clinical findings negative; consequently children are sent to hospital with diagnosis of marasmus, wasting, weakness of spine, etc., and in one case after an operation for appendicitis it was thought that a subdiaphragmatic abscess was forming; however, *x*-ray examination showed the typical picture of this bronchopneumonic type. Even after the nature of the disease is apparent, until gross consolidation and cavitation appears radiologically, there is no dullness, no loss of vocal resonance, and on auscultation only a prolongation of the expiratory phase can be determined, but rapidly increasing weakness and emaciation are present. The spread of the infection is shown by the increase in size and coalescence of the shadows with appearances of cavity formation. In many cases tubercle bacilli have not been found in the sputum, but the nature of the infection was proved on *post-mortem* examination. Then caseous mediastinal glands and a generalized tuberculosis were noted frequently, but it is not easy to say which were the original lesions and from where the infection proceeded, and especially whether or not the lung infection and the general miliary infection, which was usually present, occurred at the same time. (It is possible that the individual tubercles may grow and break down at a more rapid rate in the lung parenchyma than in other body tissues.) Occasionally though the lungs have been studded with bronchopneumonic areas the mediastinal glands have been unaffected.

Type B.—Acute bronchopneumonic phthisis in children seems to be rare. Radiologically it is indistinguishable from a bronchopneumonia which is breaking down, except that in this case the other lung is not usually affected. Large cavities may be formed with spread of infection to the other lung.

Type C.—Occasionally, and usually in the lower lobes, a caseous area may be detected in the parenchyma which may have been the focus of the miliary spread.

3. *Hilum Tuberculosis.*

This is uncommon and shows first as an increase in the size and opacity of the hilum shadow. Occasionally both are involved, but one increases at a much more rapid rate. The normal variation in depth of the hilum opacity is replaced by a denser homogeneous shadow with diffuse and indefinite edges, except where these appear to connect with the interlobar fissures; spread seems to be more rapid along the latter, and from them opacities shade into the clear area of lung parenchyma. Eventually the opacity may reach the lateral chest wall, but before this occurs an irregular area in the centre shows increased translucency, and within a short time a large irregularly shaped cavity is seen. While these changes are taking place in one lung, the other also shows a spread of the infection, being studded with discrete shadows which rapidly increase in size and show signs of cavitation. In tuberculosis of the lungs of the bronchopneumonic or hilum type in infancy a unilateral chest infection has not yet been seen.

4. *Chronic Tuberculosis in Childhood.*

After the period of infancy the resistance to general tuberculosis seems to increase and the typical picture of the bronchopneumonic type does not occur so often after the age of 8, but instead appearances suggestive of the adult type of chronic phthisis are visible. The evidences of the disease are seen first as an increase in size and opacity of the hilum shadow; this opacity finally extends to the apex of the affected side as an elongated branching shadow showing at intervals along its course circular opacities with fairly well marked outlines. These shadow areas are not discrete but communicate with each other, and at the apex, or below it, there is an area of consolidation with, at a later stage, cavity formation. As the infection proceeds the hilum shadow increases in size and the outline of enlarged and presumably caseous mediastinal glands may be visible at the edge of the median shadow. Occasionally small areas of extreme opacity are present close to the vertebral border in the region of the hilum; these are probably partially calcified lymphatic glands. In some cases a small median heart is present, the so-called *cor pendulum*, and in very chronic infections there is flattening of the ribs on the affected side. Rarely a large cavity or number of cavities with smooth walls have been seen, usually in the lower lobes; these contain fluid and air, but the tuberculous nature has not been demonstrated at necropsy.

Secondary Tuberculosis.—Tuberculosis of lungs and pleurae secondary to tuberculosis of spine or ribs is usually of the bronchopneumonic type.

Differential Diagnosis.

1. The apparently normal variations in extent and density of hilum shadows, clearness of parenchyma, tree-like branchings due to shadows of bronchi and their accompanying vessels, are very great.

2. The variations which may be pathological are still more numerous; these comprise: (1) The increased hilum and branching shadows which may persist for months after measles, whooping-cough, and influenza. (2) Shadows in the position occupied by the thymus gland; these are curiously inconstant and a greatly enlarged gland may fail to produce a shadow. (3) Deviation of trachea. This is seen, on following the course of the shadow of the trachea downwards, as a sharp kink either to right or left, but more commonly to the right, followed almost immediately by another kink in the opposite direction, which brings the shadow into a line parallel to its former course. This occurs near the level of the second dorsal vertebra, and is accompanied usually by an enlarged mediastinal shadow. Possibly the condition may be produced by enlarged but invisible mediastinal glands.

3. The lung pictures due to other pathological processes which must be differentiated from, or may obscure the lesions due to the tubercle bacilli, are:

Abnormal obesity; patches of scleroderma.
Splayed out rib ends in rickets.
Pleural exudates.
Unresolved pneumonia; acute lung abscess; congenital atelectasis; bronchopneumonias due to other infections—for example, septic, influenzal, etc.
Syphilis of lung; bronchiectasis; fibrosis of lungs; tumours—hypernephroma, sarcoma, chloroma.

In the time allowed it is impossible to discuss each of these conditions; in my experience none of them produce the typical radiogram of bronchopneumonic phthisis. In rickets the rib end shadows and the lack of aeration make accurate diagnosis difficult. In acute lung abscess the history and the unilateral infection should suffice for a differential diagnosis, while in bronchiectasis the dense opacity, the altered rib angles, and the fact that it is unilateral and the median shadow is displaced towards the side of the lesion, indicate the likely diagnosis. In septic bronchopneumonias the shadows of the lesions are neither discrete nor sharply defined.

We have been unfortunate in not yet having secured a *post-mortem* examination on any case suffering from secondary tumours in the lung, but the examples seen differ from the bronchopneumonic type of phthisis in the lesser number of the lesions, their larger size and indefinite edges, and in their marked tendency to produce pleural exudates.

Summary.

As indicated in the foregoing remarks, I believe the bronchopneumonic type "A" to be the most common form of pulmonary tuberculosis in children detectable radiologically, and that it produces the radiogram on which alone a diagnosis can be made with reasonable certainty.

III.—C. PAGET LAPAGE, M.D., F.R.C.P.

DIAGNOSIS OF PULMONARY TUBERCULOSIS IN CHILDREN.

ADOPTING Dr. Riviere's suggestion, I will state at the beginning that my remarks will deal with children of the age period 5 to 14. After a few references to severe pulmonary tuberculosis, I shall pass on to deal with the form which at the moment presents the greatest problem—hilus disease, be it only glandular or be it actual lung tissue disease.

The following figures, given to me by Dr. Sutherland of the Public Health Department, Manchester, show that fatal pulmonary tuberculosis is diminishing, but that it does nevertheless often occur.

Pulmonary Tuberculosis: Primary Notifications and Deaths in Age Groups 5–10 and 10–15 Years.

Year.	5 to 10 Years.		10 to 15 Years.	
	Notifications.	Deaths.	Notifications.	Deaths.
1917	152	20	166	42
1918	106	16	115	41
1919	118	19	120	26
1920	98	6	96	27
1921	104	7	99	18
1922	107	7	92	14
1923	103	8	84	18
Totals ...	788	83	772	186

My own impression, as a physician who sees both in-patients and out-patients at a general hospital for children, is that there have been fewer cases of severe pulmonary tuberculosis during the last ten years than during the previous ten.

During the earlier period, in a study by Dr. Mair and myself of 150 consecutive autopsies on tuberculous children (150 out of 323 total autopsies), we found that 104 showed thoracic tuberculosis, 21 no gland disease, 21 no lung disease, 40 showed cavity formation, more or less chronic, often with secondary generalized changes, and 43 acute generalized changes. The surprise was the number with chronic cavities, and the numbers at age periods were 10 under 2 years, 11 at 2-5 years, 12 at 5-10 years, and 7 at 10-14 years. It is also to be noted that 83 had severe lung lesions. The school age may therefore be a resistant age, but severe pulmonary tuberculosis is not rare—or at least was not.

Dr. Riviere says that the wards are the places to see severe pulmonary cases. It is my practice not to admit such patients to a general ward for children; even with balcony arrangements they are too dangerous to others, and they need prolonged treatment for too long a period for the ordinary hospital. Cases with sputum and tubercle bacilli or with crepitations and signs of cavitation are advanced cases.

My remarks will be chiefly on the slighter and earlier cases of so-called hilus disease. Time will not permit me to give evidence of the high incidence of tuberculosis, but it is so generally accepted that I need not do so. With this high incidence there must be many cases never diagnosed, who make a spontaneous recovery; but many do not. We should therefore try to summon all our powers of observation to make the diagnosis as early as possible. What are the earliest symptoms and signs? First of all we find the child in a toxic state; there are other infections which cause a similar toxic state, such as rheumatism, influenza, etc., but of toxaemias, tuberculosis is the most common and a differential diagnosis can usually be made. The symptoms are as follows. The child is losing flesh and going downhill, shows pallor, loss of appetite, and debility. There is lassitude; the patient is always tired and sitting by the fire. Headaches are frequent and the child is moody and peevish. The mother may have noticed flushing in the afternoons, indicating rises of temperature, and night-sweats may occur. A chronic cough may have been present since an attack of measles, whooping-cough, or influenza. On inquiry it may be found that the child has frequent colds.

The following signs should be looked for. In the first place, there is usually a very striking loss of tone in the skin, in the muscles and ligaments, and in the system generally; as Sir Robert Philip says, the child looks "shabby." In the skin loss of tone is shown by a dry, dirty, dough-like appearance with diminished elasticity; by pallor, which incidentally does not always mean a great degree of anaemia; and by an excessive growth of downy hair. One can really form a pretty definite estimate from the first glance at the chest and the patient. In the muscles and ligaments loss of tone causes a giving way where an effort is needed to keep the structures in position. Scoliosis and flat-foot are the most common manifestation, and if examination is made for them they are found extremely often. Walking is an effort, and the muscles generally are suffering from toxic disturbance. Professor Lorrain Smith has pointed out to me that there are actual changes in the muscles due to toxins, and Sir Robert Philip states that "the tuberculous toxins seem to act especially on neuro-muscular structures. Their dystrophic influence is evidenced by the loss of sarcous substance and associated irritability of muscle." These neuro-muscular effects are in evidence long before a local lesion is apparent in the chest. The heart and blood vessels also suffer. An irritable state of the heart is present, and after an exercise test the pulse quickens unduly and takes too long to return to its normal. The general functions of the systems are all impaired for the same reason—that is, the continual circulation of toxins. Wasting is evident, and in thoracic infection the wasting is perhaps more marked at the back of the neck, in the upper arms, and between the scapulae. Here also are the downy hair and the venules if present.

Having found all or some of these symptoms and signs we can place the child in the suspicious class and proceed to make examinations which point to tuberculosis, and to eliminate other causes of toxaemia. At this point it should be stated that the history of exposure to infection from a tuberculous person is very important. If there is a parent or relative or an attendant with tuberculosis in the house it is a very significant point: searching inquiries should therefore be made.

The tubercle bacillus may reach the lungs in other ways than by direct inhalation and especially in the case of the glands, but infection from human sources is so common and in some cases so rapid that it is difficult not to believe that the bronchial glands are infected from some source in the bronchi, just as the cervical are from the tonsil.

Having found our evidence of continued toxaemia, we next proceed to the chest examination by percussion, auscultation, and other methods, such as the *x* rays. We must remember that we do not expect to find crepitations, neither do we expect areas of dullness, except at the roots as described by Dr. Riviere. In the absence of decisive physical signs it is very important that examinations of the chest, and especially those of the *x* ray, must always be associated with the presence or absence of signs of toxaemia, the reason being that at the roots the areas of dullness to percussion or of opacity to *x* rays may remain in the case of a healed lesion. Consequently there is always the danger of diagnosing a healed lesion as active if reliance is put on slight changes to percussion in the chest or on the *x*-ray examination alone. On auscultation some points are of importance: harsh breathing, and especially cogwheel breathing, should be listened for. Cogwheel breathing may be heard at a base or at an apex in front, and is a very suspicious sign. It is sometimes accentuated by nasal breathing if there is obstruction, and then the child should be told to breathe deeply through the mouth. If this is done the abnormal breathing may be lessened, but it will not often actually disappear, though obstruction does accentuate it. D'Espine's sign of whispering pectoriloquy below the second dorsal vertebra when the child whispers "Three thirty-three" is another important sign of early trouble.

The interpretation of the *x*-ray examination is difficult, but if evidence of enlarged glands can be made out, or if woolly areas can be seen, and if at the same time the ordinary clinical examination and the symptoms point to

active toxaemia, then this examination is a most important one. It confirms the cause of the toxaemia as tuberculous and also indicates the extent of the disease. But by themselves *x* rays cannot always distinguish between active and healed lesions.

The von Pirquet reaction does not distinguish active from healed lesions and is therefore of little use except in young children. Even a negative result is not conclusive, because there may be no reaction in some active cases of pulmonary tuberculosis. A reaction means that there has been a tuberculous infection at one time or another, and not that the present illness is tuberculous. Faulty technique is a frequent source of error. The sputum test is seldom of service, because we should, in children at any rate, diagnose tuberculosis and cut it short before it reaches the stage where bacilli are present in the sputum. A final point in diagnosis is the reaction to treatment: if the child steadily improves under the treatment which will now be briefly indicated, the diagnosis is confirmed.

The great secret of success in the treatment of such cases is to take them early and treat them for a sufficiently long time. We have to promote fibrosis and ultimately calcification, and both these processes take a long time. We cannot promote fibrosis until we eliminate toxaemia; therefore our first effort is to eliminate toxaemia, and nothing is better for this than rest, physical and mental. By rest we abolish strain, and, what is more important, we cut down toxaemia by lessening circulatory disturbance. In addition, we need air, sunlight, and, if possible, a sunny, breezy climate; even in town areas we can find breezy situations and use artificial light. But first of all we need rest; much can be done even in town houses and town hospitals in the way of successful open-air treatment if rest is enforced. No doubt others will deal in more detail with the question of light and air. Diet is also of great importance; a liberal protein diet often succeeds better than too much fat in the form of milk, eggs, cream, and emulsion. These foods may defeat their own object by causing biliousness. As a medicine nothing approaches creosote in its effect, even though it is so very nasty.

Let me end by entering a plea for more schools for the child with mild thoracic tuberculosis. The treatment is lengthy if fibrosis and ultimately calcification is to be complete. Children's hospitals have other work to do than patching up these cases once a year. The child spends its time in hospital or under treatment at home, but is always missing education, and later on the child may be an infective agent or at least a weakling. We need residential schools for these cases on parallel lines to those for hip and spine cases. These surgical cases have been dealt with first because their problem is the more obvious; but it is not any the more pressing.

IV.—C. W. VINING, M.D., M.R.C.P.

I WOULD like to express my thanks to Dr. Riviere and Dr. Suttie for their most able and important papers in connexion with this contentious and difficult subject.

It is, I think, important that we should make some distinction between what we mean by a tuberculous infection and tuberculous disease. We agree that infection with the tubercle bacillus is extremely common during childhood, and, as Dr. Riviere's figures show, by the age of 14 years 50 to 70 per cent. react to tuberculin tests. I take it that this means that over 50 per cent. of the child population have had to mobilize their resistive forces against the bacillus. The large majority defeat the bacillus, many so successfully that a macroscopic lesion does not appear, but others do not do so before a visible lesion of the gland has been produced. It appears to me that the word "disease" from the clinical standpoint should stand for a condition of ill health brought about by the toxins of the bacillus reaching the general circulation, or the effects of the local disease breaking down and producing local abscess formation.

Whilst among children of school age local tuberculous disease is only too frequent, yet I am one of those who are still very far from convinced that disease of the lung tissue is at all common during these years except in the form of more or less acute disease developing as a terminal event. The problem which we are specially concerned with is the frequency of intrathoracic disease of a chronic nature sufficient to produce a state of ill health in a child of school age.

Now there is here, I think, a danger of placing too much importance upon a tuberculous focus as the explanation of an existing state of impaired health. If a tuberculous lesion is confined to a gland or group of glands—if, as we say, it is strictly localized—it is hardly ever the cause of constitutional disturbance of any moment and will not explain constitutional debility of long standing. For tuberculous disease to produce wasting, anaemia, listlessness, and debility that disease must be such that toxins are reaching the general circulation in considerable amounts, and when tubercle is strictly localized this does not take place. If, therefore, in any case of impaired health it can be shown that the glands in the chest are infected with tubercle their presence is not necessarily an adequate explanation of the ill health unless active disease has already developed outside the glands, and in this case the child will almost certainly die.

In the large majority of debilitated children even if 70 per cent. of them have at one time been infected with tubercle, and even if some of them actually have tuberculous glands, their debility in the large majority of cases is due to chronic nutritional defects, chronic catarrhal dyspepsia, and chronic toxaemias arising from the bowel, the throat, or, in girls, the urinary tract. That local tubercle, if present, is a source of danger to them I agree, since there is always the risk—which, however, is not very considerable—of the bacillus getting free and setting up far-reaching disease from which the child will probably die. In my opinion the degree of risk is lessened or increased according to the frequency with which the cause of the child's debility is recognized and removed. I feel that this point is of importance because the so-called pre-tuberculous child is treated so often with large quantities of milk, virol, and cod-liver oil, all of which frequently add to its digestive difficulty.

As regards the frequency with which intrathoracic tuberculous lesions are present amongst the child population, I would like to ask Dr. Riviere what proportion of school children of the cities show signs such as he has to-day described to us. At the beginning of his paper he gave us some figures from Berlin and Vienna with reference to "structural lesions discoverable *post mortem*" amongst children, and these figures showed that during the age period 5 to 14 some 50 to 77 per cent. of the cases had visible lesions. Figures obtained from the *post-mortem* records of a children's hospital are of course of no value as indicating the incidence of tuberculous lesions amongst the child population of any community. Knowing as we do the large proportion of cases of active tubercle that find their way to hospital, it naturally follows that statistics from a hospital source only prove that tubercle as a killing disease stands high amongst the causes of death, but they give us no idea as to the frequency of tubercle as a cause of death amongst the whole child population, or the incidence of the localized tuberculous lesion. One can prove anything from statistics, of course, but I should like to put before this Section as briefly as possible figures that I have collected by an examination of the *post-mortem* records of the Leeds General Infirmary over a period of ten years; they only refer to patients dying in hospital between the ages of 5 and 15 years. At Leeds all cases are examined with the exception of a very small number indeed. The records are carefully kept and the examinations are general, and although the cases are not all examined by the same individual yet the examination is always carried out by an experienced pathologist.

I realize that there are already available statistics from several sources, including those brought forward some years ago by Dr. Lapage, and the excuse I have for bringing mine before this Section is that they are compiled from the records of a general hospital, the causes of death being representative of all classes of disease, which is, I think, a point of some importance, as I think the figures are likely to represent the disease incidence of a community more closely than those of a special children's hospital.

I also appreciate the fact that when tuberculosis is not specially looked for at autopsy small lesions may be missed, and therefore the figures I shall give you possibly underrate the frequency of the macroscopic lesion. On the other hand, my figures are at least an accurate measure of disease likely to have caused signs and symptoms during life.

During this ten years' period 563 *post-mortem* examinations were performed on children between and including the ages 5 and 15. Of the 563 cases 185 (32.8 per cent.) presented tuberculous lesions, and in 98 (17.2 per cent.) of the cases death had been directly brought about by tuberculosis. Of the 465 cases where death had not been caused by tubercle 86 (18.6 per cent.) had visible lesions. Among the 465 cases there were 103 cases where death had been caused by accidents, and these, I think, are a fair example of the child population; amongst these 14 (13.5 per cent.) showed tuberculous lesions. Probably 50 per cent. of these 103 children would have reacted to tuberculin if tested during life. We are, however, specially concerned with intrathoracic tuberculosis. Of the 563 cases 112 (19.7 per cent.) had intrathoracic lesions; 18 of these were merely examples of miliary tubercle of the lung forming part of a generalized miliary termination. In 83 (14.7 per cent.) of the total cases lesions of the mediastinal glands were found, and in 64 of these the lesion of the gland was the only intrathoracic lesion present. In 30 (5.3 per cent.) of the total cases there were tuberculous lesions of the lung substance or pleura other than merely miliary lesions, and with or without lesions of the mediastinal glands. Amongst the 465 cases where death was not directly due to tubercle 27 (5.8 per cent.) presented intrathoracic lesions, 25 of them being lesions of the gland only. Amongst the 103 cases of accidents 4 only had intrathoracic lesions, the glands only being affected.

Considering the 30 cases which had tubercle affecting the lung tissue or pleura, miliary lesions only being excluded, the type of disease found in the different cases is as follows: One case of acute tuberculous pleurisy, forming part of the termination in urinary tuberculosis; 3 cases with scarred apices; 4 cases with one or two small caseous foci of the substance of the lung; 7 cases with acute tuberculous bronchopneumonia; 8 cases with acute apical tuberculosis and early cavity formation, 3 at both apices and 5 on one side only; 7 cases of chronic tubercle with acute disease around and comparable with the chronic phthisis of adults—4 of these cases were over the age of 10 years, the youngest being 6 years. So far as I could gather from the notes, there was no case of chronic lung disease starting from the hilus of the lung.

As regards the cases showing tubercle of the thoracic glands, a considerable proportion—certainly more than half of them—had nothing more than a few recent foci in one or two of the glands, not sufficient to produce real enlargement of the glands. Massive multiple enlargement sufficient to produce a shadow at *x*-ray examination was the exception. Of the 30 cases with lung tissue tuberculosis more than miliary 12 had no disease of the tracheobronchial glands at all, 8 had quite recent and unimportant lesions, while the remainder had well marked tuberculization of the tracheo-bronchial glands.

With reference to the possibility of making a diagnosis of tubercle affecting the glands at the roots of the lung, it is difficult to see how a localized group of infected glands in the root, say, of the right lung can produce a well defined area of paravertebral impaired resonance. I understand Dr. Riviere to say that this paravertebral dullness is not caused actually by the glands themselves, but by changes in the lung substance and root tissues in the neighbourhood of the glands. While I have the greatest respect for the facts laid before us this morning, upon which I want to keep a perfectly open mind, yet anatomical considerations make it difficult to see how this paravertebral dullness can be brought about. In an average child of school age the root of the lung lies slightly nearer the anterior surface of the chest than the back, and between the lung root and the percussing finger over the back at one side of the spine there is a distance of about three inches; filling up this interval there is the voluminous air-containing posterior lobe bordered on the inside by the bodies of the dorsal vertebrae. The root is therefore deep, quite shut away, and covered over by a mass of lung. One would have thought that an inflammatory mass or area of collapsed lung at the root, if it was able to produce impaired resonance over the back, would have done so in a more general way, being reflected, as it were, towards the back in a radiating manner and leading to an impaired note over a far more extended area than the paravertebral dullness described by Dr. Riviere.

As regards the *x*-ray evidence of tuberculous infection at the lung root, I, in common with many others, am continually being disturbed by the question as to what is within the normal range of shadow and what constitutes evidence of disease. A short time ago I decided to have *x*-rayed after death children dying from disease affecting parts other than the chest, or from the results of accidents, and then compare the *x*-ray findings with the *post-mortem* findings, and I should like to pass round some of these pictures. I have so far only been able to procure five—too few to draw certain conclusions from, but sufficiently instructive perhaps to be of use in this discussion.

I trust I shall not be thought to be trying to underestimate the dangers and importance of tuberculosis during childhood. My object in entering this discussion has been to emphasize certain points in connexion with intrathoracic tubercle—namely: (*a*) the danger of accepting the *post-mortem* records of a children's hospital as a measure of the incidence of terminal and localized tuberculosis amongst the child population; (*b*) the infrequency of chronic tuberculosis of the lung in children; (*c*) the doubtful possibility of being able to diagnose tuberculosis of the glands at the root by clinical signs or *x*-ray photographs; (*d*) and to emphasize the fact that the debilitated states of children, even when there is evidence of gland infection, are due to causes which in the large majority of cases have nothing to do with tuberculosis.

GENERAL DISCUSSION.

Dr. CHARLES MCNEIL (Edinburgh) dealt with the clinical type described by Dr. Riviere—namely, the school child, with or without cough, not seriously ill, and with no obvious signs of disease in lungs or pleurae. This child was presumed to be suffering from thoracic tuberculosis, the disease affecting the mediastinal lymphatic glands and possibly also the tissues of the lung itself at the root. The problem of the diagnosis of this deep-seated tuberculous disease was one that had perplexed and baffled a generation of physicians. As an aid to diagnosis they had been offered a series of local signs—the Eustace Smith sign, the d'Espine sign, and the sign of parasternal dullness. Each of these was occasionally present, but none was constant and reliable. Now Dr. Riviere put forward a high claim for right-sided paravertebral dullness as a cardinal diagnostic sign in mediastinal glandular tuberculosis. Dr. McNeil objected to this claim that it was not dullness but only impaired resonance, and therefore not easy to appreciate, and that there was already an area of physiological paravertebral dullness. In his view too high a claim had been made for this new sign. In many cases of this so-called tuberculous school child, the diagnosis rested, not on any local sign in the thorax, but on the general signs of malnutrition, together with a positive tuberculin reaction and the absence of disease in other parts of the body. In such cases the diagnosis was only one of probability, not of certainty. Some concluding remarks were made on the clinical value of the cutaneous tuberculin reaction. Its chief value was in excluding tuberculous disease. Where this reaction was negative they could at once cease to suspect tuberculous disease in the child under investigation. Further, the test did not fail, as was often alleged, in cases of acute or advanced tuberculous disease, provided the test was properly performed and account was taken of late reactions.

Dr. F. G. CHANDLER (London) said that a physician to a famous children's hospital once told him that pulmonary tuberculosis did not occur in children; this was intended epigrammatically, but the statement could not be justified. Within the space of ten years at the Victoria Park Chest

Hospital, where comparatively few children were admitted, he had been able to collect over 80 proved cases of chronic pulmonary tuberculosis in children from the ages of 3 to 14 (proved by the discovery of tubercle bacilli in the sputum), and 240 probable but unproved cases.

Of the proved cases, 24 gave a history of symptoms extending over one month, 14 over six months, 12 over one year, 21 over two years, and 15 a long history with a sudden onset of severe symptoms.

The predominant symptoms were: cough, 72 cases; wasting, 47 cases. The next most frequent were: haemoptysis, 14 cases; night-sweats, 11 cases. He was, however, ready to admit that tuberculosis of this adult type might be uncommon in young children, but it did occur, and children could infect others. He believed that tuberculosis of the mediastinal glands was common. The seeds of the fully fledged disease in later life were probably sown in infancy, and the commonest situation of their long residence was in these glands. Calmette (p. 167, quoting G. Hedren) gave a table showing that in 47 necropsies of tuberculous children under one year old the bronchial glands were affected in 100 per cent. of the cases, and the mesenteric glands in only 57 per cent. Repeatedly in making necropsies in all kinds of cases there was found evidence of old tuberculous lesions in the bifurcation glands, more commonly here probably than in any other part. This being the case, it seemed reasonable to suppose that when this disease was active there existed symptoms, but it was just at this point that controversy was found. That tuberculosis of the bronchial glands occurred no one would dispute, but that it might cause symptoms, spread to the neighbouring lung tissue, give physical signs, be diagnosable as hilus phthisis, and finally spread into the lung until it reached the surface, was regarded by many as a myth. Kingston Fowler called it "shadows seen through a glass darkly," which was delightful as an apophthegm, but evaded the important issue.

Absence of mortality did not imply absence of infection; might it not be that tuberculosis killed off all the most susceptible in the first year and then started slowly and insidiously on the rest? For many years the disease might be almost dormant. The long chronicity of pulmonary tuberculosis was not sufficiently recognized; it might exist for ten or twenty years or even more; without a doubt it existed long before it caused haemoptysis, wasting, sputum, or night-sweats. If, then, the mortality began to be appreciable at the age of 15, this was strong presumptive evidence that the infection began much earlier. In diagnosis the following points were of great help. A barking dry paroxysmal cough at night—often described by mothers as a croupy cough; vague ill health; fever, especially in the evening; night-sweats; loss of weight, or failure to gain weight. There might be parasternal or paravertebral dullness, and Krönig's bands might be narrowed. Whispering resonance might be heard loudly over the dorsal spines down to the fourth, fifth, or sixth. This, d'Espine's sign, he considered of great value, though not absolutely pathognomonic of enlarged bronchial glands. There might be functional systolic murmurs, but these were of little help in diagnosis. Retraction of the lower lung border sometimes occurred, so that there appeared to be impaired resonance over one base. There might be constant localized râles in any part of the chest, and the earliest stage of clubbing of the fingers, the skin bordering the nail losing the small lines in it and becoming pink and shiny, while the nail bed became blue. The more obvious signs included evidence of a small pleural effusion, or when the lungs were definitely infected there might be the classical signs of dullness, crackling râles, and altered breath sounds.

In making a diagnosis, other forms of chronic infection or toxaemia must first be excluded—for example, *B. coli* infection of the urinary tract, infected tonsils and adenoids, and otitis media; and one must bear in mind the possibility of a foreign body in the bronchus, non-tuberculous fibrosis, post-pneumonic conditions, bronchiectasis, and tuberculous glands in other parts. The smallest particle of sputum was worth examining, but too commonly this examination was neglected. Frequently no sputum could be obtained, and then an examination of the faeces might prove of value. The faeces should always be examined for tubercle bacilli, since, under conditions where uninfected food was being taken, their presence was almost as pathognomonic of pulmonary tuberculosis as was tuberculous laryngitis. *X* rays helped very little in establishing a diagnosis of tuberculosis of the mediastinal glands. Whenever possible an *x*-ray examination should be made, to exclude in doubtful cases certain foreign bodies, and to reveal any spread of the disease into the lungs; moreover, in certain cases the hilus shadows were so dense that they must be regarded as abnormal. There was, however, far too great a tendency amongst many radiologists to stigmatize all hilus shadows and striations as tuberculous, so much so that the constantly positive reports had become a jest.

As regards treatment, a pure milk supply was necessary. There were anatomical reasons why the mediastinal glands were the most subjected to bombardment by the tubercle bacillus, whatever its mode or site of entry, as Krause's experimental work had demonstrated. It was impossible to believe that the bovine bacillus could not infect these glands. Whether its long sojourn there—a sojourn perhaps of very many years—could effect a transmutation to the human type he could not assert; experimental evidence was against such a view, but no one, on the other hand, could assert dogmatically that such a metamorphosis was impossible.

Dr. Chandler was convinced that if every human case of open tuberculosis were diagnosed, and if every one so suffering—or so affected rather, for they might be suffering very little—saw to it that not one of their bacilli reached another human being, and that if a pure milk supply could be at once assured, then tuberculosis would be stamped out in a generation.

Dr. JOHN A. WATT (Derby) said that the most common form of pulmonary tuberculosis in school children was hilar and perihilar disease. He agreed with Dr. Riviere that a right-sided paravertebral dullness was the most constant and important physical sign in hilus tuberculosis. It might extend out for two to three inches from the central line. Left paravertebral dullness appeared later and was not so frequently seen. The next sign in importance was d'Espine's whisper test. In applying the test a number should be whispered and listened to either by the stethoscope or direct ear, when the characteristic tracheal echo might be heard downwards as far as the fifth to the seventh dorsal vertebra. Krönig's areas could be mapped out with some precision in older children. The venous signs on the front of the chest, or apical telangiectases, were of no value. The sputum should always be examined by a concentration test. If the whole film were carefully searched positive results would be frequently obtained. Screening of the chest was never sufficient, a radiogram must be taken; after the examination of the sputum it was the most important aid to diagnosis. Hilus disease in children was benign, the activity covering a period of twelve to eighteen months, and nearly all recovered. It might smoulder for years, spreading further into the lung, and waking into slight activity with each fresh catarrh. There was accumulating evidence that some of these patients developed the adult type of disease and died in adolescence. Of 116 sanatorium patients, 56 (nearly 50 per cent.) had a few tubercle bacilli in the sputum. After an average period of four years there had been one death. The adult types of fibrocaseous or fibroid pulmonary tuberculosis, rare in infants, became more common about the age of 12, and increasingly frequent thereafter. They gave little difficulty in diagnosis, for the signs resembled those found in adults, and tubercle bacilli were nearly always present. The mortality was very high—75 per cent. were dead after an average period of three years. Public money was being spent on dealing with the end-products of infections contracted in infancy. The average duration of the disease from infection to death might be put at fifteen to twenty years. The time was approaching for a reconsideration of the whole question, but no one could doubt the wisdom of

searching out cases of early pulmonary tuberculosis in children and treating them in sanatoriums.

Dr. Eric Pritchard (London) regarded the methods described by Dr. Riviere and Dr. Suttie as very valuable aids in the diagnosis of pulmonary tuberculosis and enlarged bronchial glands in children, but neither of them was readily available for the average practitioner. This was of little moment, since they had such a valuable and reliable means of diagnosis as the reaction to the subcutaneous injection of tuberculin. For many years past he had made use of this test in all doubtful cases, and he had been well satisfied with the results; the method was simple and free from danger. In mild cases there was merely a slight constitutional reaction with rise of temperature, or a fall of temperature followed later by a rise, but in cases in which there was serious or extensive disease there was a focal reaction as well. For the diagnostic test he almost invariably used Koch's old tuberculin; it was, however, important to remember that though there might be no reaction to tuberculin of human type, there might still be one if bovine tuberculin was used. He agreed with Dr. Vining that it was important to distinguish between malnutrition which predisposed to tuberculosis and malnutrition which was its result. Most extensive tuberculous lesions were compatible with what appeared to be a perfect condition of nutrition. The problem of tuberculosis was its prevention and not its cure. Prophylaxis might be specific or non-specific; with respect to the latter, all such matters as housing, feeding, fresh air, sunshine, and exercise must be taken into consideration. With respect to specific prophylaxis, they had to attend to the prevention of the conveyance of infection by appropriate means, and they could render the tissues relatively immune to the growth and development of the tubercle bacillus by the systematic injection of the appropriate antigen. He believed that there were very few physicians in this country who had attempted prophylactic inoculation against tuberculosis. Dr. Crofton had practised it for many years, using his own specially prepared antigen. Dr. Nathan Raw had also recently made use of attenuated cultures of the living bacillus. For the last thirteen years or so Dr. Pritchard had used various tuberculins for this purpose, and he was now using Dr. Crofton's tuberculin. His series of cases was not a large one, for it was very difficult to persuade parents either to submit their infants to the treatment or to persevere for the length of time during which it was necessary to continue the inoculations—namely, about six months, with weekly inoculations. Of the forty cases (all babies) in which he had completed the course of treatment all were alive, and the oldest child was 12 years of age. The cases had all been infants who had been exposed to a dangerous environment of tubercle, either the father or the mother suffering from the active disease. At the end of six months' treatment these infants could stand very large doses of tuberculin without giving any violent reactions, so large, indeed (in the case of certain tuberculins no less than 1 mg.), that it was highly improbable that any accidental or fortuitous infection even with massive dosage would cause any serious trouble. He believed that the systematic inoculation of infants predisposed to tuberculosis or living in a dangerous environment was the real solution of the tuberculosis problem.

Dr. E. E. Prest said that the number of cases with infection was large, but the number with serious clinical symptoms was small. In Ayrshire no patient could be admitted to a sanatorium without notification. When these patients wished to get insured or go abroad years afterwards they were asked to say whether they had ever been in a sanatorium. It might be as well to call sanatoriums by some other name to avoid prevarication. It was a serious thing to be notified if this was to be carried through life. It caused a stigma to be cast on patients who were often in better health than many other people. Some insurance companies would not even take cases which had been exposed to infection until two years had elapsed.

The President (Dr. Leonard Findlay) also took part in the discussion.

SECTION OF PUBLIC MEDICINE AND INDUSTRIAL DISEASES.

Herbert Jones, L.R.C.S.I., D.P.H., President.

DISCUSSION ON INDUSTRIAL WELFARE.

OPENING PAPERS.

I.—W. F. DEARDEN, M.R.C.S., L.R.C.P., D.P.H.,

Medical Officer of Health, Port of Manchester; Certifying Surgeon.

The great war left behind it many legacies, and whilst most of them have proved to be of a very unwelcome character there are undoubtedly some which show well marked indications of becoming exceedingly valuable to the legatees. It certainly taught a very valuable lesson by showing how, in spite of the hugeness of modern mechanical and scientific equipment as used both in warfare itself and in the home preparation of war material, the human factor must be taken into account in the achievement of results. It was the high pressure under which war industries were carried on, coupled, of course, with the long hours worked, that brought home to the national management the fact of the human machine being just as much liable to wear and tear and breakdown as the iron machine, and equally in need of being kept in good running order or alternatively being laid up for repairs. What we now know as industrial welfare, which had hitherto been regarded as a suitable and interesting experiment for philanthropic employers, was thus shown to be a practical proposition of general application, and may be said to have been handed over to British industry by its sponsors, the Health of Munition Workers Committee, as a going concern. It is undoubtedly a legacy of value, the real extent of which the future will reveal. It will help to an appreciation of its real significance to know that the twenty-five whole-time welfare workers of pre-war days swelled to 800 female and 150 male supervisors during the height of war production, and that there are probably now some 600 to 700 supervisors in industry.

The rapid rise to prominence of industrial welfare is certainly one of the marked features of the present time, and, as its advent involves the practical application of many principles of industrial hygiene, some discussion by this Section of its merits as a factor in the combating of industrial ill health and unfitness should prove of interest, not only to the profession, but to those outside who look to it for guidance.

I must first endeavour to explain as clearly and as simply as possible what I understand by the term "industrial welfare." To my mind it covers the devising and functioning of ways and means for bringing about and maintaining an improved standard of health, vigour, and well-being among those engaged in industrial pursuits. This may not be considered a sufficiently broad view of the subject, but being a medical one is necessarily not taken from quite the same angle as would be the case with the employer or the welfare worker. The employer does not look on welfare as purely a health question. To him it has a very important economic aspect as well, though it must be admitted that this is mostly relegated to a subsidiary position in this country. An employer is, however, bound to realize that a healthy and contented worker will stick to his situation longer, do his work better, and lose less time than one of the opposite variety. A statement made by Professor Collis in the course of an excellent address delivered at the Glasgow meeting of the Association has a remarkable bearing on this phase of the question. It was to the effect that industrial medicine, if properly applied, could bring about an annual saving in labour turnover of from sixty to seventy millions sterling, in lost time of fifty to sixty millions, and through industrial convalescence of many millions more. Making what he considered to be a conservative estimate, he assessed the total possible saving to industry at £140,000,000 a year. These figures are staggering, of course, but we may be quite sure that Professor Collis would not have published them unless he had been perfectly satisfied about his basic facts and figures.

In America the economic aspect would appear to be paramount, but the results of the extensive schemes for health and social betterment necessarily benefit the workers as well as the shareholders. According to Professor Sand[1] the National Cash Register Company, in 1892, noticing that a big proportion of their products were being returned on account of faulty construction, looked into the matter, and came to the conclusion that the root cause should be ascribed to the depressing conditions under which their employees lived. They started gardens, dining rooms, schools, playing fields, sports, etc., and the work improved beyond anything they had hoped for. This author also cites the case of the coal and steel production at Birmingham (Alabama) as typical of the American standpoint. These products were first worked by nigger prison labour at little expense in the way of wages, but the results were so bad that free labour was substituted. As the new workers had to lodge in the filthy and uncomfortable quarters of their predecessors the output was still behind. In 1913, *purely with the object of improving production*, says Dr. Sand, a big scheme of reforms was instituted, including housing, clubs, schools, hospitals and dispensaries, fresh water supply, baths, cloakrooms, and gardens, and this proved so effective that the output improved in quality, volume, and steadiness, and both wages and dividends increased. The extent to which some of the big American firms push their social betterment schemes is extraordinary, but there appears to be no doubt that experience has taught them that their other great paying system of scientific management cannot be satisfactorily worked without the additional advantages of the social venture. All those who have adopted such schemes declare the annual cost against turnover to be remarkably small, and are quite emphatic about the increased profits produced. These projects in the United States are purely voluntary, and Dr. Sand tells us that out of the thirty-eight millions of industrial workers over there eight millions are under some degree of medical supervision.[1] The industrial physician is quite a factor in the profession. Some of the universities, notably Harvard, have taken up research work in industrial medicine, and carry out special courses of training for medical men desiring to adopt this branch of the profession as a definite career.

Industry is not quite on the same plane in this country as in America. The huge mass production factories over the water do not require their workers to be skilled tradesmen, but take the raw material, in many cases fresh to the country and speaking several languages, and allocate to each individual the particular sectional work suitable to his physique and abilities. Scientific management looks after the quality and quantity of output. In this country the workers are trained in definite occupations, so that this class of scientific management is scarcely a feasible proposition. Nevertheless, the proper recognition of the human factor in production is making distinct headway, and, as previously mentioned, many firms have taken up welfare. Some of them have been carrying out a full medical and social programme from pre-war days. The principal exponents are, however, mainly to be found in the luxury trades, but this in itself shows, to my mind, that the creative reason had nothing to do with multiplication of output, but belonged rather to a desire to have a clean trade carried on under the best hygienic conditions, by a healthy, well ordered, contented, and cleanly set of workers. The impetus has not been of the commercial and money-making variety, but may be ascribed rather to a desire to spend money philanthropically, and these particular trades have, fortunately, been well able to afford the expenditure.

The systems evolved form fine object-lessons for those who wish to emulate them, and well merit the closest study. They start with the basic principle that the healthiest work is that carried on in the fresh clean air of the open country by placing their factories well outside the big towns, housing their departments in separate, well spaced out buildings, providing light, airy, and systematically ventilated workrooms, with scientifically designed artificial lighting arrangements, excellent and ample sanitary accommodation, and the best washing facilities, including baths, are to be found. Cloakrooms, canteens and messrooms, rest rooms, first-aid and ambulance rooms, are part of the usual equipment. A whole-time medical officer in a well fitted up department examines all employees on engagement, attends to accidents and sudden sickness, is available for advice on symptoms attributable to working conditions, and supervises the general and particular hygienic arrangements of the factory. In some cases he attends those under 16 years of age at their own homes. A whole-time dentist examines the teeth of newcomers, attends to dental emergencies, and pays particular attention to the teeth of those under 18 years of age. It is also usual to find an up-to-date nursing scheme. Outside the factory buildings are flowers, trees, shrubs, grass lawns, tennis courts, and bowling greens, as well as cricket and football fields. Halls, libraries, and swimming-baths are also in evidence, and most, if not all, the firms referred to have developed their own housing schemes on modern lines. Special efforts have been made to develop a works "spirit" among the employees by getting them to elect their own committees, both for works purposes and for social efforts. All grades, from workers to managers, act on these committees, which are popularly elected and are given full control of the affairs which are assigned to them to manage. One well known firm allocates £2,000 per annum to a social welfare fund administered entirely by one of these committees.

These are, of course, the ideal schemes from the point of view of the medical hygienist, involving as they do the practical application, to a high degree, of probably every known general principle of industrial hygiene and being subject to expert medical guidance throughout.

Many firms who are not able, for perfectly good and mostly obvious reasons, to establish these complete schemes for securing health conditions in industry, have found they can do a great deal in the direction of welfare, even though compelled to proceed on modified lines. It is this class of firm which provides the greatest scope for the operations of welfare supervisors, and it is really marvellous what these workers are able to accomplish in the way of amelioration of adverse conditions in the factories concerned. The obligations taken up by welfare workers vary in nature, extent, and degree in different factories and industries. They may be limited to first-aid, investigation of sickness and accidents, home visiting of the sick, attending to the carrying out of the certifying surgeon's directions contained in certificates of fitness, and the acting as general adviser and counsellor to the workers, or they may be very extensive indeed. The work is mostly taken up in factories employing female labour, so that consequently the posts are mainly in the occupation of the same sex. There are, however, some highly successful schemes in charge of male supervisors at works employing men and boys, these including ironworks and shipyards. Although the greater part of the work has relation to industrial hygiene, industrial medicine, or industrial psychology, the welfare supervisor looks upon her operations as coming more within the scope of industrial sociology. The production of comfort and well-being, the counteraction of monotony, the easing of otherwise irksome restrictions, the promotion of safety measures, vocational selection in accordance with mutual suitability, time and motion study, selection of dietaries, fixing of rest pauses, the acting as intermediary or connecting link between employer and employed, the supervision of cloakrooms, rest rooms, washing and sanitary arrangements, and of canteens, the establishment of social functions and games, the running of works committees, and a general effort to establish what is known as a "works spirit" among all ranks of the employed, are all examples of a very wide scope of duties taken in hand. All of these have for their aim the dealing with employment from the human side, and for their efficient carrying out require a great deal of tact combined with a varied and extensive knowledge and experience. It is therefore not surprising that the occupation of welfare supervisor should now be looked upon as particularly suited to the well educated and experienced woman or man. The university graduate is highly favoured for the work, but either he or she, before taking up the appointment, is required to undergo special courses of study and practical training, and to pass an examination. Courses of study and the attendant examinations have been instituted by the London School of Economics and by several universities. They deal

with economics, economic history, social and political philosophy, psychology, public administration, industrial law, business organization, industrial structure and problems.[2] University candidates take a one year's course, and all others take a two years' course.

Some of the work, however, may be claimed to constitute a definite medical side of the duties. Every welfare scheme includes a first-aid equipment and mostly some provision for ambulance as well. This may be established in a separate room, in a part of the rest room, or occupy a space in a general welfare room which has to fulfil all purposes. If the welfare supervisor has a nursing qualification, as not infrequently happens, the equipment and its housing are usually quite good. Most commonly the supervisor, however well qualified in economics, social philosophy, and such like subjects, has only the backing of St. John Ambulance or Red Cross certificates to indicate proficiency in first-aid and nursing. The accommodation, fittings, and equipment are thus very varied, as could only be expected where previous experience in a well arranged ambulance room has not been the lot of all these ladies. Most of the firms taking up welfare make the mistake of not seeking medical advice in the designing and equipment of their first-aid rooms. It would certainly pay them to adopt such a course, and if not caring to consult a practitioner in the neighbourhood it would be very easy to ask the certifying surgeon, during one of his ordinary visits, to plan out the requirements suitable for the particular factory. It must be realized that the first-aid experiences of a welfare worker are not by any means limited to the dressing of wounds and the application of boracic fomentations. She has naturally to deal with frequent menstrual emergencies—such as faintings, headaches, dysmenorrhoea, and hysterical bursts—wherever female labour is largely employed. Again, when she has succeeded in one of her principal aims—namely, to gain the confidence of the workers—it soon becomes a custom to consult her on any ailment which arises, either in the course of the work or otherwise. She may administer a palliative such as sal volatile or effervescing citrate of magnesia and recommend a visit to the panel doctor; but as the establishment of such a custom opens up an avenue for obtaining valuable information respecting the influence of trade processes on health it appears to me a pity not to make better use of it. There are other cases, such as workers returning after illness, where it must be somewhat difficult to decide on their fitness for resuming employment; and workers repeatedly staying away for apparently insufficient reasons present similar difficulties. There are also cases of physical defect, apparent ill health, or the effects of fatigue detected whilst carrying out routine duties in various parts of the factory.

Where there is a whole-time works doctor these practical difficulties which face the welfare worker in sole charge would not arise. But industry is not carried on in this country on anything like the lines laid down in America, and I am satisfied that the industrial physician will never be wanted here to anything like the same extent as across the water. The bulk of factory work in this country is particularly suited for the activities of the really purely British innovation, the welfare supervisor, who it has been proved can look after the human element in a highly satisfactory manner.

I think I have shown, however, that welfare work as carried out in British factories requires supplementing by a certain amount of assistance from the medical profession. I have gone very carefully into this matter; and may I say here that one of the most pleasing features attending my task has been the very willing and welcome help accorded to me by the principal officers of the Welfare Workers' Institute? You may, therefore, take it that what I have to say on the subject has the full support of welfare workers themselves. It is perfectly competent for any employer who has adopted welfare to obtain just as much or as little part-time service from a medical practitioner as may be requisite to ensure the proper working of his scheme. From my own experience I can say that a great deal can be accomplished in the required direction during attendances of an hour's duration once or twice a week. First-aid of all kinds is placed under proper supervision. The right appliances, drugs, and dressings for the particular industry and the particular factory can be provided and kept up to date, and the welfare supervisor will be able to carry out the various first-aid treatments under the direction of a competent adviser. Cases of doubtful fitness for resuming employment after illness, and loss of time through alleged sickness, can be looked into. An arrangement of this kind very soon causes the establishment of a small clinic, not only from the supervisor passing on cases requiring a medical opinion, but through the workpeople taking advantage of the doctor's visit. Medical treatment should not be undertaken, and really there is no call for it; the applicants are quite satisfied on being told they require treatment and should see the doctor. The value of this part of the system can perhaps best be illustrated by examples such as the following. Quite recently a welfare supervisor at a cotton mill referred to me two men from the card-room who had the well known dust symptoms peculiar to strippers and grinders. One was a stripper and grinder who was carrying on his work with a defective stripping brush cover, and the other was engaged in emptying the "dirt" boxes beneath the machines. Repair of the stripping brush cover in the one case, and the supply of a suitable respirator in the other case, met the requirements and resulted in the disappearance of the symptoms. Another man, at the same mill, came to ask me if he was suffering from cotton-spinners' cancer, and went back to his work a much happier man on being assured that such was not the case. At another works I was able to find out that a man was being regularly doped through working at a process believed by the firm to be quite harmless. There are also matters of hygiene upon which the supervisor is required to keep a vigilant eye and on which a little technical advice in season is very welcome.

Where a considerable number of young people are employed and the certifying surgeon is already making regular visits for the purpose of examining these, the practice of asking this officer to undertake this particular medical branch of welfare work is steadily gaining ground. In districts where factories are few, arrangements of this kind work out very well, but in large industrial districts the capacity of the certifying surgeon for taking on extra work is distinctly limited. If, therefore, the system spreads, as it appears likely to do, it seems to be somewhat obvious that prominent industrial areas must either have more certifying surgeons or the extra work must be more generally undertaken by the general practitioner. The advantage of employing the certifying surgeon is due to the welfare supervisor being required to give special care and attention to the younger end of the workers. If she does not actually engage these young people herself she has usually a say in the engagement and the allocation to a suitable department, so that she is able to proceed on safe ground when made aware of the exact state of health of the applicant and the type of employment suited to an ascertained physical condition. Where an arrangement such as I have outlined is in operation the medical examination is more detailed than is required for ordinary Factory Act purposes, and particular attention is given to eyesight, teeth, and tonsils. In big industrial towns the applicants requiring special treatment can be referred to eye, throat, and dental hospitals, or under certain other conditions to a private doctor, but in all circumstances the welfare supervisor makes it her business to see that the medical instructions are carried out. A large firm in my own district, which has many mills and a plentiful supply of welfare workers, has made private arrangements with an ophthalmic surgeon for special examination of all eye cases referred to him by the certifying surgeon, and has, I believe, under contemplation the establishment of a dental department. A medical card is made out for every young person and is designed to contain all the necessary factory medical record up to 18 years of age, or longer if thought desirable. Re-examinations, both periodical and when specially ordered, are part of the system, as is usually the taking of heights and weights. In some cases arrangements are made for the visiting medical man to take first-aid and home nursing classes.

Although, as I have previously indicated, no one in this country thinks of regarding welfare from the point of view of increasing output, I have no hesitation in expressing

the opinion that, as practised, it is a distinctly paying proposition. Contented workers will certainly do better work than discontented workers, but apart from this truism a well directed supervision over lost time and labour turnover must effect a very considerable monetary saving for any firm which gives the system a fair trial. It has undoubtedly come to stay, and already promises to become one of the most important features of industrial reconstruction. To what extent my views on the necessity for some degree of medical supervision or co-operation will be acted upon I am not prepared to say; I do think, however, that any employer who adopts them will not lose anything by doing so, whether he confines his venture to the visiting practitioner or extends it to include the ophthalmic surgeon and the dentist. I think I should say in conclusion that I have considered it to be my proper policy in compiling these introductory remarks to endeavour to give you, in the first place, a fairly comprehensive idea of what is generally understood by industrial welfare, and for the rest to point out, to the best of my ability, the possibilities presented for useful service by the medical profession from the clinical aspect. I have not dealt with the purely public health phase of the subject, or with its influence upon the research worker, or with the extent to which physiotherapy comes within its scope, for I have felt quite satisfied that those who are to follow me will amply cover any deficiencies of mine in those directions.

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II.—DAVID McKAIL, M.D., F.R.F.P.S., D.P.H.,
Glasgow.

WELFARE is an Anglo-Saxon compound meaning well-doing or well-being; industrial gives its special application. Industrial welfare suggests that there is such a thing as its opposite; unfortunately, this is too true. A slight modification of Burns's famous lines expresses the result of such action, or want of it, "Man's inhumanity to man makes countless thousands mourn"—that is, "miserable." There are still men who make no pretence to observe the common decencies of life in the workshops and factories controlled or owned by them, in the matter of cleanliness, reasonable spacing and lighting, and sanitation. Such social pariahs should be given short shrift when discovered by the authorized authorities. A fair number are engaged in the sweetmeat and baking trades, and in their case the adage applies, "What the eye sees not, the heart grieves not." That welfare is required in cases like these goes without saying.

The same may be said of all unhealthy and dangerous trades. Here, also, it must be confessed, there are employers who sin against the light, and who find Balaams to bless what they ought to curse. But with regard to the employments where the employer provides proper and healthy conditions, is there any need for so-called industrial welfare? The answer is both No and Yes.

For all adult men no further welfare is needed than to provide proper working conditions (including hours of labour), and to pay the best wages compatible with economic demands, but always above a basal living rate. To these may be added, payment for holidays (after all, this is only a matter of adjustment), for all those in regular employment for one year or six months. Any further excess profits may be distributed as a bonus. The adult male is of age, and should make or mar his own life, so far as the community of which he is a part will permit him. It is probably not advisable for him to be bound in his amusements to his workmates. In such a case he is in much the same position as the young man of the family who remains at home—parental control is apt to repress his self-expression and self-realization. Let him get out among his fellows, with their different experiences, and there develop, for good or ill, the mettle that is in him.

If our young man gets married he will find for some years at least that the home demands will make calls on most of his spare time, and welfare in the shape of recreation grounds may have little value for him during that time. Besides, his school may have provided him with facilities which attract more, and from such a cause he may be lost to the other provisions. All of these are arguments for the conclusion that, with the exception of a firm in a township which it has created, the provision of certain facilities is supererogatory. Rather let groups of firms collaborate to secure certain public playing fields, with pavilions; excellent public baths and clubs, and public amusement halls, all under some joint control, and they will have served the community as a whole. The provision of facilities for enjoyment of rest and recreation during the long winter season should receive more attention; at present there is only the amusement caterer to look to. With the better housing of the people and the appeal of "wireless" ordinary home enjoyments will be rendered more attractive; but there will always remain that restlessness for change which is a characteristic of human nature, and therefore of all classes; to meet this some of the provisions mentioned should be made. Take the case of baths; what stodgy affairs are the ordinary "public baths"! It will be objected that the newer houses have baths. Yes, when the water is hot. Many people get into the metaphorical "hot water" by suggesting a bath when the occasion does not suit the domestic queen or when economy in coal or gas is in the ascendant. But even though the fates are propitious, how plain is an ordinary bath compared with the luxury of a bathing room, with its hot and cold sprays, its douches and its needles. Many of our school children have already experienced these, but have to forgo their continuance from lack of opportunity. The provisions need not stop at baths; there are gymnasiums and other things, for it is useless to ignore our climate, which especially in recent years has washed out most outdoor sports and pastimes, even in summer.

The "Yes" answer refers to young persons, and to some extent to adult women. With regard to young persons, industrial welfare is not only a praiseworthy and admirable action, but may be claimed to be a necessity. In times of industrial activity the school boy or girl of (at present) 14 years of age is, within a few weeks of cessation of school attendance, entered on a new sphere of action. The whole conditions are changed. From attending school from 9, 9.15, or 9.30 a.m. to 12.30 p.m., with a break for play and "piece" at 11 a.m., the midday meal 12.30 to 1.30 p.m., afternoon session 1.30 till 4, with a play break at 3 o'clock, the young person is switched on to hours 7.30 or 8 a.m. until 12 noon, or 12.30 or 1 p.m., commonly without a break for rest or food, followed by an afternoon period of four, four and a half, or five hours, with or without a break. These young people are at an important stage of their development into manhood and womanhood. The boys have just begun the final spurt in their growth in length and bulk, which is notably shown between the ages of 13 and 17 years. The girls are nearing the end of their rapid physical development, which in this country seems to take place between 11 and 15 years, and in their case the accompanying sexual changes are more obtrusive than in the male and more associated with physical and psychical phenomena.

These facts suggest to the industrial student that there is room for supervision in the engagement and employment of young persons—in other words, in their industrial welfare. No doubt, in the domestic factory or workshop, if the employer is gifted with kindly human nature, any difficulties likely to crop up can be readily adjusted; but in the large modern factory, where systematization and organization are the watchwords, there is a definite need for an officer with executive authority, whose duty it is to see that the necessary adjustments are made in the case of the young persons employed, and who becomes experienced in solving the problems that arise, and in forestalling their occurrence. That officer is the welfare worker, and in large factories he or she, or he and she, assume all the duties formerly dispersed among the personnel of masters, foremen, and gatemen, by whom the raw material was added to the list of employees in the shape of apprentices and assistants. Into the qualifications of such officers I do not propose to enter: choose them well, and having done so and proved their value, trust them thoroughly and treat them well. Far better for a firm

to avoid welfare work, if they are not convinced of its necessity, than to embark on it half-heartedly and with a disposition to carp. If they do embark on it, let it rather be with a conviction that they are aiming at getting something of value, though intangible, and only visible to the eye which brings with it the power of seeing, though possibly accompanied by other values, to be seen and known of all men and women.

I have stressed the fact that these young people are passing through an important phase in their physical development. I wish to add that without any organized welfare department they are deriving much benefit from their absorption into the industrial system. This is testified to by many. It seems to be due to the fact that as wage-earners their allotment of food is increased and more nearly equals their growing needs. I know that this is a two-edged argument, the other edge being that these children, previous to starting work, are underfed or partially so. Unfortunately, this is the case, especially in the elder children in large families. A boy of 14 will eat as much as the average woman, which is eight-tenths of the amount required for the average man doing moderate work; a girl, about seven-tenths; a child of 10 to 13 years, about six-tenths; 6 to 9 years, five-tenths; 2 to 5 years, four-tenths; and under 2 years, about three-tenths. With a number of mouths of varying ages to feed, and none of the children working, and the worker's wage much the same as when he started housekeeping, it is easy to believe that the proportion of food allotted to each person in the household will be under, rather than over, the necessary amount. Hence the great improvement seen when the household funds are increased ever so little by the first child's earnings.

These and other matters worthy of careful study (and in some cases already receiving it) make one a believer in, and an advocate of, industrial welfare for the young, and strengthen its claims as a necessity of the case—namely, the engagement and selection of workers, supervision of young persons, arrangement of food and rest pauses, the supervision of first aid, and the keeping of records.

With regard to adult women also, there are many kinds of usefulness for a woman welfare supervisor. One of the main services in welfare work lies in helping the workers to have various minor ailments and symptoms attended to, with in many cases their cure and removal. These may seem small matters, but in the sum are of great importance.

In welfare work thus carried out we have a potent means of applying preventive medicine. "Prevention is better than cure." When the worker has his or her various symptoms and minor ailments attended to on the spot, apart from the increased comfort and well-being, there is definite delay in the onset of, and probably total prevention of, industrial disease and decay.

Summary.

1. In all factories it is highly desirable that a definite scheme of welfare supervision should be in operation for all young persons.
2. Where many women are employed the provision of welfare facilities is recommended.
3. In dangerous and unhealthy trades welfare supervision for all adults should be compulsory.
4. In food factories it is highly expedient that special welfare facilities should exist.
5. Some degree of medical collaboration is necessary in all welfare work.

GENERAL DISCUSSION.

The President of the Section (Dr. HERBERT JONES), in opening the discussion, reminded his audience (amongst whom were a number of representatives of the large industrial firms in the neighbourhood, and several of their welfare workers, who had been invited to take part) that industrial welfare was no modern innovation, for the first Josiah Wedgwood carried it out in principle at the end of the eighteenth century, when he built houses and established an open-air swimming bath for the benefit of his employees. His biographer, Llewellyn Jewitt, wrote: "To be comfortable himself he must know that those around him were comfortable also; to be happy he must impart happiness to others, even to the most lowly of his employees; to sit at ease in his own new home he must know that those he employed were well and cosily housed. He therefore set about building a village for his workmen and their families."

Dr. DAVID MCKAIL (Glasgow) thought that Dr. Dearden's paper would be most helpful in settling the spheres of duties of works medical officers and welfare supervisors. He agreed as to the necessity of having the supervisor acting in conjunction with the medical officer. He could not speak from personal experience as to the American situation, but he would like to draw attention to one vital difference—namely, that here we had the workers insured for medical treatment, while there no such insurance was in vogue. This made welfare work, in its medical part at least, an additional cost in this country. No doubt it was with this in his mind that Dr. Dearden recommended that the welfare doctor should not undertake treatment, but confine himself to the giving of advice, any treatment required being sought for in the proper quarter.

Dr. G. T. WILLAN (Carlisle), speaking as a whole-time works doctor, commented upon the expediency, convenience, and economy of having a doctor on the spot to attend to emergency work. In doing this he did not trespass upon panel practice at all, for the panel doctor received his capitation fee in any case while the works doctor did the work, but it was necessary to have a satisfactory welfare system in order to gain the full advantage of having a doctor stationed at the works. In his opinion where the employees numbered 2,500 or over it paid to have a works doctor, and there was an immense saving in time, sickness prevention, and voluntary absenteeism—the bugbears of all big industrial undertakings. Further, the welfare department took up the young person of 14 to 16 years of age, a critical period of life which was not provided for in the big national schemes; it also looked after the injured and mutilated worker, and prevented him "going down the line" and ceasing to be an economic asset to the community.

Dr. T. W. SINCLAIR (Melbourne, Australia) said he could hardly venture to accept the President's invitation to criticize, as he had come to learn. He had great admiration for the work that was being done in this country, and during his travels in America he had noted that they looked to Great Britain for guidance in this as well as in other matters of public health. He was interested to know that the foundations of industrial welfare had been laid so long ago by Josiah Wedgwood, and he thought the work could be rendered much more effective if those concerned in it agreed on a certain scheme and concentrated upon it.

Mr. G. ARMSTRONG (Bradford Dyers' Association) took up the subject from the employer's point of view. Welfare work should commence with the young worker. Young people of 14 to 16 years of age were not overlooked, for there were two Acts of Parliament dealing with them—namely, the Choice of Employment Act (1910) and the Fisher Education Act of 1918. These Acts should be put into operation, and the school medical and educational record should follow the young worker into the factory. The doctor could be of great use in industry in the sphere of young workers, but welfare work of this kind could only be successful if done with the fullest approbation of the workers themselves.

Miss SHUTE (Chief Welfare Adviser, Messrs. Lister and Co.) thanked the Section on behalf of the supervisors present for associating them with the discussion. She felt that the movement would greatly benefit by the honour paid them. She asked for consideration to be given to some compulsory method of dealing with young persons below insurable age, as that was the period when deterioration became so apparent, and seemed such a waste after the education authority had done so much for the health of the school child.

Mr. R. J. MACKAY (Bradford Dyers' Association, Ltd.) entered a plea for closer co-operation between the medical practitioner and the industrial psychologist with regard to the elimination of "industrial misfits." Certain firms were experimenting with vocational tests, psychological and physiological, in order to evolve more scientific methods for the placing of industrial personnel. Optical services for the benefit of the workers on processes demanding close eye-work and appreciation of colours were much needed. Both mental and physical qualifications of the youth required, and should get, careful and systematic attention. Let those responsible for these two fields of vocational diagnoses hold themselves in readiness for closer and more effective co-operation. As an example of what had happened he quoted the experience of a certain engineering firm that found only 50 per cent. of its apprentices "made good," and regarded this as "fairly satisfactory," while another firm had spent four years trying to instil the principles of dyeing into a person who proved to be colour blind!

Miss KERR (Supervisor, Ricketts, Ltd.) raised the question of the attitude of the general practitioner or panel doctor towards putting boys or girls on the insurance in order to enable them to be sent away to convalescent homes in cases where such a stay might avert a breakdown or serious illness.

Dr. W. CRAIG promptly answered that no conscientious doctor would give a sickness certificate merely in order that the boy or girl should have a holiday, but if it was clearly for the benefit of their health he would certainly do so. He also inquired what were the duties of a full-time factory doctor, and whether he had any supervision of the home conditions, dietary, etc., and, conversely, what was the attitude of the worker towards the employer-paid official doctor?

Dr. J. JENKINS ROBB (Bournville), formerly medical officer at Cadbury's, expressed himself in favour of taking this work out of the hands of private firms and making it a national one. The works doctor, he said, was apt to be influenced by his connexion with the firm, and he ought to be in an entirely independent position. His experience had taught him that there was great need for care of the young person after the 18th or 19th year, because it was then that a falling off in health became marked, and after 23 to 25 years of age the decline was rapid. This must be checked. At the same time they must avoid anything of the nature of "coddling"; the spirit of independence and self-reliance must not be interfered with. The medical man must protect the worker, who was rightfully fearful lest he should become a mere cog in the industrial wheel.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

SPONTANEOUS RUPTURE OF THE HEART.

THE following is a report of the case of an obese woman, aged 62, who had been an inmate here since 1887, certified as a melancholic and later as a dement. On admission she was somewhat vaguely described as having "heart disease" and a "cardiac mitral murmur."

From 1895 until the day before her decease she worked in the laundry, with the exception of four years (1915 to 1919) during which she was employed in the kitchens. Part of her work in the laundry consisted in carrying buckets of coal a distance of twenty-five yards. She enjoyed quite good health until recently, but there is a note, dated March 10th last, stating that she was "rather exhausted looking." On July 10th she had gone to the laundry as usual; she did not look well, but in reply to the laundress said she was all right. She ate a rather good dinner at midday, but in the afternoon complained of feeling "fagged," and so sat down and rested. She appeared to be much as usual when put to bed by the nurse at 8 p.m. in a dormitory which she shared with seven other mental patients, and which was visited every two hours by the night nurse. Nothing out of the ordinary was noticed at the 4 a.m. round; but on visiting the ward again at 6 o'clock the nurse found the deceased out of bed on the floor in a semi-sitting posture apparently dead, with head bent forward and face cyanosed. I arrived a minute or so later and found no sign of life save what I thought was one slight sighing expiration when I raised the head and opened the mouth. In the absence of signs suggesting cerebral haemorrhage I concluded that death was due to heart failure. Unfortunately the other patients were unable to give a very reliable or even coherent account of what had taken place. From what I could gather, however, it appeared that the deceased had been noticed about 5 a.m. rolling on the bed groaning, and evidently in some pain. One patient saw her lurch out of bed later and fall on the floor, and endeavoured, though unsuccessfully, to help her up.

Post-mortem Examination.—The pericardial sac was found to be distended with blood clot surrounding the heart and slightly adherent. The heart was enlarged and fatty (19½ oz.). There was slight atheroma of the coronary arteries and also of the bases of the mitral cusps. The left ventricle was enlarged, and on the inner surface of its anterior wall was a mass of organized blood clot closely adherent to the wall and extending to the interventricular septum. Opposite this mass on the external surface of the left ventricle was a small irregular perforation, but no apparent aneurysmal dilatation was present, although the ventricular wall appeared thinner here than elsewhere. Evidently there was leakage of blood for some time prior to death, and the gradual stretching of the pericardium was probably responsible for the pain experienced shortly before death. There was slight dilatation of the aortic arch and early atheroma was present; and there was also advanced atheroma of the circle of Willis. The kidneys weighed 5½ oz. each and were granular and fatty, but the capsules stripped fairly easily. The liver was large and congested, weighing 59½ oz., and the lungs were emphysematous.

A Wassermann reaction was never taken in this case, but it is improbable that she had ever had syphilis.

I have to thank Dr. Bartlett, the medical superintendent, for permission to publish the case.

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CAESAREAN SECTION FOR PLACENTA PRAEVIA.

THE following case presented a somewhat unusual combination of serious complications.

A primipara, aged 34, was first seen by me in consultation when her pregnancy had reached the thirty-fourth or thirty-fifth week. Her doctor had been called three weeks previously on account of a sharp haemorrhage from the uterus, lasting only a few minutes, and which cleared up completely after a few days' rest in bed. At that time he noticed that her legs were a little swollen at the ankles, and elicited that she was a little breathless when going about her ordinary housework. She was accordingly kept in bed from that time until three weeks later, when I was asked to see her on account of a second profuse uterine haemorrhage two days previously. Examination revealed an eight and a half months' pregnancy with the foetus in the first vertex position; the head was freely movable above the brim; foetal heart 144. The mother had a very loud, harsh, double aortic murmur with well marked Corrigan and capillary pulses; she was short of breath, even when lying in bed, and had to be propped up at night. Pelvic examination showed central placenta praevia, no portion of the fornices being clear, and a slight degree of generally contracted pelvis, the true conjugate measuring about 3¾ inches. Well marked albuminuria was present and the legs were oedematous below the knees.

She was not bleeding at the time of my examination, and it was just possible to pass one finger through the internal os. Regarding the placenta praevia as the most immediately serious complication, I had the patient removed to the Princess Mary Maternity Hospital to be under close observation. In my opinion Caesarean section presented the only safe method of delivery, even though the slight degree of contracted pelvis could be ignored owing to the relatively small baby. The generally accepted teaching that Caesarean section for placenta praevia should be confined to those cases which are at or near full term obviously requires modification as the scope of this excellent operation is widened. Originally the operation was regarded purely from the standpoint of the foetus, but there can be no doubt now that it should be performed in some cases purely in the interests of the mother. In the case under consideration it was decided that the alternative treatment by packing and bipolar version would entail much more shock and haemorrhage in a patient whose heart condition was ill fitted to stand it, than would a rapid Caesarean section. Moreover, the chances of the survival of the child were considered to be vastly better with the latter form of treatment.

The question of anaesthesia then arose, and spinal stovaine was considered, but in view of the fact that any fall in blood pressure in the presence of a grave aortic lesion would be unduly risky, it was decided to employ ordinary careful open chloroform and ether, which in my experience has always given excellent results in the presence of valvular heart lesions. Ordinary eliminative and dietetic treatment was started for the albuminuria, and no active measures were adopted in the absence of any bleeding, in the hope of gaining time and obtaining a less premature baby. Thirty-six hours after admission, however, the patient had a third profuse haemorrhage, necessitating immediate packing of the vagina, and about half an hour later a rapid Caesarean section was performed under open chloroform and ether anaesthesia. The ordinary upper segment operation was performed and there was little haemorrhage. The placenta was almost entirely in the lower uterine segment. A healthy male child weighing 6½ lb. was delivered, and the mother made a complete afebrile recovery and left hospital three weeks later.

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Reviews.

THE HIPPOCRATIC OATH.

THE beautiful print and general get-up of *The Doctor's Oath: An Essay in the History of Medicine*[1] is an appropriate setting to the scholarly contents of the text by Mr. W. H. S. JONES, who is so well known in connexion with his view that malarial infection was the cause of the decadence of the Greeks, and is, it may be noted, bursar of St. Catharine's College, where Sir Norman Moore, who subsequently did so much to popularize medical history, was the undergraduate librarian. As a scholar Mr. Jones is a welcome and invaluable recruit to the historians of medicine, and our gratitude goes out to him for what he has done and what it is to be hoped he will do in illuminating the dark places of medical history. The preparation of this small and much condensed monograph has involved the labour of collating more than thirty manuscripts. It is shown that the document called "the Hippocratic oath" presents many problems, and so will always interest the historian of ethics as well as the medical profession.

There are two versions of the oath—the pagan and the Christian; and the variants, especially of the Christian version, suggest that the document was widely circulated and underwent alteration more freely than the comparatively pure text of classical authors, for the Hippocratic writings were textbooks, the general sense of which was the important point, and not literary masterpieces. Mr. Jones, indeed, exclaims on the freedom with which the writer of the Christian oath has treated the original, and seems at a loss to find a parallel instance. The existing manuscripts of the oath are enumerated and critically discussed, and translations of the two main versions and of their variants given, as well as some of the originals, among which special attention should be directed to two facsimiles of the Christian oath.

The question of the operative clause, which does not appear in the Christian version, is considered in an interesting manner; the two interpretations, which are to the effect "I will not operate, not even for stone," and "I will not operate for stone," are very different in their bearing; from their being out of place in a context referring to moral considerations it has been suggested that there is a hidden reference to castration; Mr. Jones, however, shows reason to think that this explanation is unlikely, and puts forward the suggestion that this clause was not in the original, but was introduced later to suit the prejudices of some physicians. The other differences between the pagan and the Christian oaths are detailed, and among them the omission in the Christian version of all clauses tending to encourage a trade union leads Mr. Jones to believe that this version of the oath was written in the early age of Christianity before the benevolent communism of its first devotees was forgotten. These are but a few of the problems so ably and attractively treated in this valuable monograph.

RADIOLOGY.

THE first edition of *Radium, X Rays, and the Living Cell*, by COLWELL and RUSS, was published in 1915. It at once supplied a want that had been greatly felt by radiologists; the second edition[2] has benefited from the accumulated experience and publications of the intervening years, and concisely embodies the many developments which have followed since 1915. The scope of several of the chapters has been extended to meet the growth of the subjects dealt with, and at the end of the book the reader is presented with a summary of the views held regarding the action of radiations, and with an attempt to enunciate a number of laws. This has been a difficult task, but on the whole the authors show clearly that they are alive to the importance of attempting to lay down conclusions in regard to problems which interest all students of the effects produced by radiation. A study of this chapter will encourage further research on similar lines.

The action of radiations from an *x*-ray tube and radium is dealt with in a number of interesting chapters, each of which deals with a particular form of cell, from the simplest in structure to the most complicated: each gives an admirable summary of the work of other investigators, and is thus a most valuable addition to the knowledge of the subject. As a work of reference for research workers and radiologists in general we cannot speak too highly of the book. The radiologist who is concerned with the treatment of disease, particularly malignant disease, will find in its pages information of the greatest value.

It is fortunate that the authors should have dealt with the subject in such an interesting manner, and the book supplies a great want in the publications dealing with the new subject of radiotherapy. The early chapters deal with the physical data of radiations, and these form a most attractive part of the work, being lucid, comprehensive, and not too voluminous. Dr. Colwell and Professor Russ are to be congratulated upon the production of a book which will live through many editions, and meet with the approval of all workers in radiology. The publishers also deserve praise, for the general get-up of the book is good, the type clear, and the illustrations both numerous and instructive.

The first edition of *X Rays and Crystal Structure*, by Sir WILLIAM BRAGG and his son, was published in 1915. Two years earlier Dr. Laue had conceived the idea of employing a crystal as a "space diffraction grating" for *x* rays.

> "The successful realization of the idea by Freidrich and Kipping," we are told, "has opened up a wide field of research in which results of great interest and importance have already been obtained. On the one hand, the analysis of *x* rays, which has thus been rendered possible, has led to remarkable conclusions concerning the atoms which emit them under the proper stimulus, and has thrown an entirely new light on the problems of atomic structure; on the other hand, the architecture of crystals has been laid open to examination."

The above lines appear in the opening of the preface to the first edition; two reprints have appeared in the interval between 1915 and the present year, when a fourth enlarged edition is published.[3] In the preface to this edition the authors state that

> "When this book was written, analysis of crystal structure by means of *x* rays was a new subject, of which no connected account was in existence. During the last eight years the subject has been greatly studied and widely extended."

The fourth edition gives a fascinating account of the steps in the progress of this most interesting study, in which the authors have had so large a share. The part played by other investigators in this and allied subjects is fully stated. The reader is taken in an orderly way through the steps necessary for an understanding of the original work of the authors on crystal structure. The chapter on the production of *x* rays gives a full description of the leading points. It is instructive to read that

> "The *x*-ray bulb or tube is simply a convenient apparatus in which a vacuum is maintained so that the electron stream may be directed with sufficient velocity and without hindrance against the target or anticathode which arrests the motion."

The driving force is supplied by an induction coil, or, as is common in the work of powerful modern installations, by a high-tension transformer. The applied potentials have been varied from 10 volts to 200,000 volts, with corresponding varying quality in the *x*-ray product. The absorption of *x* rays is next discussed; in this section of the book interesting references are made to the work of a number of distinguished scientists who have been responsible for many important advances in our knowledge of this subject.

From the year 1895, when Roentgen discovered the rays which bear his name, to the year 1912, when Laue showed that they could be diffracted by a crystalline structure, their relation to other forms of radiation was the subject

[1] *The Doctor's Oath: An Essay in the History of Medicine.* By W. H. S. Jones, M.A., Bursar of St. Catharine's College, Cambridge. Cambridge: At the University Press. 1924. (Fcap. 4to, pp. iv + 62; 2 facsimiles. 7s. 6d.)

[2] *Radium, X rays, and the Living Cell.* By Hector A. Colwell, M.B.Lond., and Sidney Russ, D.Sc.Lond. Second edition, revised. London: G. Bell and Sons, Ltd. 1924. (Demy 8vo, pp. xi + 365; 62 figures, 3 plates. 21s. net.)

[3] *X Rays and Crystal Structure.* By Sir W. H. Bragg, K.B.E., M.A., D.Sc., F.R.S., and W. L. Bragg, F.R.S. Fourth edition, revised and enlarged. London: G. Bell and Sons, Ltd. 1924. (Demy 8vo, pp. xi + 322; 106 figures, 8 plates. 21s. net.)

of keenest investigation. In many respects the rays resembled light. They moved in straight lines; they traversed space without any obvious transference or intervention of matter; they acted on a photographic plate, excited certain materials to phosphorescence, and could bring about the ionization of a gas. In other respects the rays seemed to differ from light.

The first chapter of the book before us is introductory, and explains the steps in the progress of the elucidation of crystal structure by means of x rays. An interesting chapter on deflection of waves leads up to a description of the x-ray spectrometer, an instrument of precision in the hands of the skilled worker; an admirable working description of the instrument is given, by which the reader is enabled to appreciate the technical details of this most useful instrument. Chapter VI deals at great length with the x-ray spectra; many valuable tables and data of experimental work are given in it. Crystal structure is dealt with in a masterly manner, a large number of interesting experiments are quoted, and the steps in the work fully described.

The book is a record of some of the most important scientific research ever undertaken, and it proves clearly how important a discovery Roentgen made when he found that a new ray was in action when a Crookes's tube was activated. Roentgen foresaw the greatness of his discovery in a large measure, but even he could not have imagined the immensity of his discovery or the great influence it was to exercise in scientific research. In physics alone the advances have been remarkable. In what concerns our readers more intimately—that is, the application of the rays to medicine—the advances have been no less striking, though perhaps not so dramatic, nor, owing to the complexity of the problem of tissue response to radiations, so precise. Up to now students of medical radiology have been working more or less empirically; even under those conditions the advances made have been remarkable, and with the discovery of x rays a new science has been slowly developed. Radio-activity has been applied to treatment in a striking way; radium together with x rays offers a great field for research in scientific and applied medicine. Many workers have entered the field.

An appreciation of the work of the Braggs cannot but lead the medical research worker into new avenues, in which he must seek the help and collaboration of the physicist. A comparison of Colwell and Russ's book reviewed above with this book will show clearly how important has been the discovery of Roentgen in its bearings upon the future of science and of medicine. The book is charmingly written and lucidly expressed; after a perusal of its pages one realizes that in science there are new discoveries whose influence must ever be far-reaching. To the medical mind, less deeply versed in the intricacies of modern science, the conviction grows that if analytical work in cell structure could be initiated and executed with such masterly skill, possibly as revolutionizing progress might be made in cell investigation as has been done in the study of matter by the aid of x rays. Possibly the basis of cell activity might be found. The importance of a clear conception of biological processes in cellular structures might give the clue to the solving of the perplexing problems of modern medicine. The application of the methods of the physicist to the elucidation of these problems might be of inestimable value.

A HISTORY OF NOSOGRAPHY.

In his work on *Nosography in Modern Internal Medicine*[4] Professor KNUD FABER, who occupies the chair of internal medicine in the University of Copenhagen, has given an interesting and thoughtful account of the historical development of this subject from the time of Sydenham, whom he calls the founder of scientific nosography, until the present day. Emphasis is laid on Sydenham's doctrine of specifics because it is so intimately connected with his whole conception of diseases as specific natural phenomena subject to particular laws. In the following chapter, in which an excellent description is given of the work of Pinel, Bichat, Laënnec, Bretonneau, and Broussais, the author deals with the Paris school, which, though called a pathologico-anatomical school, was in reality a clinical school in which anatomy was always held subservient to clinical ends.

The third chapter is devoted to German physiological medicine, which, it is said, was characterized by a disregard of the nosography of the Paris school and an effort to reconstruct clinical medicine on physiological lines. The movement was retrograde, and was responsible for some curious errors, such as the distinction between scrofula and tuberculosis, and between diphtheria and croup, which Bretonneau had shown to be one disease. Pasteur's fundamental researches, however, proved the truth of the teaching of Sydenham, Bretonneau, and Trousseau as to the existence of really specific diseases and specific morbific causes. In the fourth chapter, which is entitled "The Bacteriologic Clinic," it is asserted that, though etiological researches on the infectious diseases created a firm basis for the nosography of these conditions, other diseases were left unaffected by this movement.

The author maintains that much greater progress has been made through the study of functional disturbances, especially in the domain of gastric and cardiac diseases, than when pathological anatomy was the only guide.

In the concluding chapter, which deals with constitutional pathology, special reference is made to the work of British investigators, such as Gowers, Nettleship, Savage, and Mott, on hereditary diseases, as well as to the researches of Hueppe, Martius, and Kraus in Germany and Paltauf and Stiller in Austria. Although this branch of clinical medicine is still in a state of evolution, many new points have been developed and new methods for estimating the state of health and power of resistance to injurious influences of each separate individual have been devised.

The work, which is illustrated by numerous excellent portraits, may be warmly recommended to all who take a philosophical interest in the evolution of medical science.

[4] *Nosography in Modern Internal Medicine.* By Knud Faber, M.D. With an introductory note by Rufus Cole, M.D. London: Humphrey Milford, Oxford University Press. 1923. (Post 8vo, pp. xiii+222; 21 plates. 15s. net.)

NOTES ON BOOKS.

THE October addresses often advise medical men to cultivate a hobby, and very good advice no doubt it is. Dr. R. T. WILLIAMSON'S hobby, or one of them, is the study of the Anglo-Saxon Chronicle, Henry of Huntingdon, William of Malmesbury, and the like. He has published recently a small book, *Before the Norman Conquest*,[5] in which he relates a series of episodes from this epoch in the history of England. He has much to say of the Saxon conquest, of the Danish invasion, and of Alfred, and finally of Canute, the Dane who made himself King of most of England. The book is addressed to "Englishmen and friends of England from the colonies and overseas," and its special feature and interest will be found in the frequent and copious extracts from the original sources.

The first edition of the *Treatise on Hygiene and Public Health in the Tropics* appeared twelve years ago. It has deservedly found favour in India, and successive editions have appeared in 1914, 1917, 1921, and 1924.[6] The name of Dr. Johar Lal Das, who was joint author of the first four editions, has been dropped from the title-page, but Dr. GHOSH thanks him for his help in the preface. The whole work has been revised and rewritten since 1921, particularly the chapters on water, with special regard to filtration and chlorination. Sewage disposal is well treated, and types of latrines used in the war are described. A new chapter has been written on sanitation of fairs and religious festivals, and anthrax has been added to the list of preventable diseases discussed in Chapter XX. In spite of condensation, wherever practicable, this edition contains 79 pages more than the last, and 37 new diagrams have been added, including several taken by permission from the *Medical History of the War*. Though the wording is condensed the style is clear, and there are not many misprints.

[5] *Before the Norman Conquest: Stories from Early English History Retold.* By R. T. Williamson. Newcastle-upon-Tyne: A. Reid and Co., Ltd. 1924. Cr. 8vo, pp. viii + 178. 3s. net.)

[6] *A Treatise on Hygiene and Public Health, with Special Reference to the Tropics.* By Birendra Nath Ghosh, F.R.F.P. and S.Glasg. Fifth edition. Calcutta: Hilton and Co.; London: Simpkin, Marshall, Hamilton, Kent and Co., Ltd. 1924. (Cr. 8vo, pp. xvi + 586; 99 figures. 9s. 6d. net.)

INTERNATIONAL MEDICAL CONFERENCE IN JAMAICA.

Health Problems in Tropical America.

An international conference on health problems in tropical America was held at Kingston, Jamaica, from July 22nd to 31st. The President was Dr. W. E. Deeks (New York), head of the medical department of the United Fruit Company, under whose auspices the conference was held. A large number of medical men attended from North, South, and Central America, about eighteen medical visitors came from Great Britain, and others from the continent of Europe.

The conference was formally opened by the Acting Governor of Jamaica, Colonel Bryan, C.M.G., D.S.O., who expressed the gratitude of the island to the Rockefeller Foundation for the admirable work it had done there for the prevention of hookworm disease. Dr. G. E. Vincent, President of the Foundation, followed with a few words, in which he referred to the appropriateness of such a gathering under the British flag, because an American like himself had to admit what great things, alike in research and administration, the British had achieved in public health. Subsequently, with Sir Arthur Newsholme in the chair, Dr. Vincent gave a popular lecture on public health in its international aspects.

Presidential Address.

Dr. Deeks, in his presidential address from the chair, said that the Western hemisphere offered a good illustration of the influence of tropical diseases in retarding the development of countries. In the American tropics the chief diseases, in the order of importance, were malaria, hookworm disease, yellow fever, and dysentery. In the lowlands from 40 to 100 per cent. of the native population suffered from malaria or hookworm or both. Thanks to the work of sanitary officers of the Latin-American governments and commercial organizations, supported by the Rockefeller Foundation, yellow fever was well on its way to extinction, the fight against hookworm disease was being successfully waged, and the same was true of amoebic dysentery; here the value of emetine, introduced by Sir Leonard Rogers, supplemented by the administration of bismuth subnitrate, had been proved. The problems involved in the eradication of malaria were tremendous, but progress was being made, as evidenced by the increasing acreage made habitable.

The Control of Malaria.

The whole of the second day's proceedings was devoted to the subject of malaria. Dr. C. C. Bass (New Orleans) spoke on the relation of the malaria carrier to malaria prevalence, and described some recent activities in the southern portion of the United States in the way of educating medical men in more effective treatment of their malaria cases, especially in so far as the cure of the infection was concerned. A paper was read by Dr. N. G. MacPhail (Guatemala) on the value of intramuscular injections of quinine. He preferred either the intramuscular or the oral administration; subcutaneous injection had nothing to recommend it as a routine measure, in his opinion. He considered that the danger of tissue necrosis incident to intramuscular injection was insignificant, at all events when compared with the life-saving value of this method. The discussion which followed revealed some differences of opinion. Sir Leonard Rogers declared himself not a believer in such injections save in extreme cases.

The Hookworm Campaign.

Dr. B. E. Washburn, of the Rockefeller Foundation, the officer in charge of the hookworm campaign in Jamaica, said that of a population of 60,000 people in the areas concerned more than 99 per cent. co-operated and were examined for hookworm disease; more than half the fourteen parochial boards of the island were enforcing the installation of sanitary latrines, and several parishes had now or were seeking whole-time medical officers of health. There had been a marked decrease in the amount of sickness from all diseases, and the improved health of the labourers had had appreciable economic results. Colonel Bailey Ashford, in charge of a similar effort in Porto Rico, said that the result of the campaign there, in which, in the course of ten years, some 400,000 people had been treated, was to reduce the death rate of hookworm disease from 333 per 1,000 to 42 per 1,000.

Yellow Fever and Dysentery.

Several papers on yellow fever were read; one of them (Sir W. Arbuthnot Lane presiding) was by Dr. H. Noguchi, who gave an account of his research work in Brazil, Ecuador, Peru, and Mexico, which, with the co-operation of others, resulted in the isolation of the yellow-fever germ.

The subject of dysentery occupied the conference for more than one very full day. Among the many papers read was one by Dr. Pierre Lepine (Lyons), who urged that all the countries of Europe ought carefully to watch the entrance of immigrants or those who were repatriating themselves from hot countries. In cases resistant to emetine, he found that, of arsenical drugs, stovarsol and acetylarsan were easier to administer and less toxic than novarsenobenzol, and also much more effective. In the same discussion Sir Leonard Rogers read a paper on the prevention and treatment of amoebic hepatitis and liver abscess; and several medical administrators in the canal zone, in Honduras, and elsewhere, related their experiences in dealing with epidemic dysentery.

Tuberculosis in the Tropics.

Sir James Fowler pointed out that when tuberculosis appeared in a tropical country the natives manifested a degree of resisting power inferior to that shown by the people of countries in which the disease had existed for generations. He outlined a scheme for a tuberculosis settlement. Dr. Deeks said that his experience was that in the case of the coloured man it was better to treat him locally, but he had invariably sent the white man who had tuberculosis in the tropics to Silver City, New Mexico, where the dry climate was wonderfully recuperative.

The Cause of Cancer.

Sir W. Arbuthnot Lane read a paper on the causation of cancer, in which he urged that cancer was the result of chronic poisoning of the tissues of the body, in the vast majority of cases by the poisons absorbed from the gastro-intestinal tract. Sir Arthur Newsholme considered that Sir Arbuthnot Lane's hypothesis was very useful, and Dr. Noguchi, Sir Thomas Oliver, and others spoke to the same effect. Sir James Fowler said that cancer was an uncontrolled cell activity. Much more had yet to be learned about the causes of that cell activity, and although the cause of cancer would one day be elucidated he did not think that object would soon be attained.

Insulin in Diabetes.

A discussion on diabetes was opened by Dr. F. G. Banting (Toronto). Insulin, he said, was a specific in the treatment of diabetes, but dietary management could not be neglected. No stated dose could be given, as this must be determined in each case by actual trial. Only a few of the more severe cases had required more than 45 units daily; and most cases treated had regained strength and weight on 10 to 20 units daily. The secret of success lay in the correct balancing of the diet against the dose to be employed, and in the exercise of eternal vigilance by both physician and patient.

Concluding Session.

The final session was occupied with the subject of leprosy, Sir Arthur Newsholme dealing with the historical aspect and Sir Leonard Rogers with the present position. Among a host of other papers read during the conference was one on blackwater fever, by Dr. J. W. W. Stephens (Liverpool); the use of vaccines and pneumonia antibody in the treatment and prevention of pneumonia, by Dr. W. H. Park (New York); some aspects of influenzal pneumonia, by Sir Thomas Oliver (Newcastle).

Although various social functions were held, those attending the conference kept very closely to business. The morning sessions began at 8.30, and there were afternoon and evening sessions almost every day.

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SATURDAY, AUGUST 30TH, 1924.

THE CONQUEST OF ENTERIC FEVER.

THE report for 1923 of the Chief Medical Officer of the Ministry of Health, of which we have given some account in this and the last issues of the JOURNAL, contains a brief but very interesting discussion of the decline of enteric fever in this country. The statistics dealt with include paratyphoid. The mortality rate per million living has fallen from 371 in 1871 to 12 in 1922. Down to the year 1900 the diminution, though great, showed much fluctuation, but since the beginning of the century it has been practically uninterrupted. Outside of Britain, a comparison between the experience of our armies in the South African war (1899-1902) and in the recent world war is very striking. In the former the average strength of troops was 209,404, and the incidence of enteric fever was represented by the high figure of 25.8 per cent., while the case mortality was 13.8 per cent. In all theatres of the world war our average strength in troops was 2,000,000, but the enteric fever incidence was only 1 per cent. and the case mortality rate 5.9. If the comparison be confined to the French Front, where more than three-fourths of our total forces were employed, the incidence rate and case mortality were still lower, being only 0.4 per cent. and 3.3 per cent. respectively. Great as is the difference in enteric fever prevalence in the general population between 1870 and 1922, the difference in army prevalence in the much shorter period between the two wars is very much greater. The facts are matter for congratulation. The one preventive the armies possessed, and the civil population practically did not, was typhoid inoculation, but Sir George Newman wisely refuses to claim too much for that prophylactic, and holds that a great deal has been done for army sanitation by protection of water supplies, reduction of the fly nuisance, and segregation and care of the sick. He points out that in this country generally the age incidence of the disease has changed; the infection has been almost extinguished at each extremity of life and the prevalence is less now in females than in males.

Influenza has so far defied all efforts at control. That infection appears to snap its fingers at sanitation in the ordinary acceptation of the term, whilst in respect of individual immunization no such success has been achieved as in variola and enteric fever. But sanitation was already doing much to curb typhoid before the *Bacillus typhosus* was discovered to be its *causa causans*. In the days before the science of bacteriology had illumined so many paths leading to conquest of infectious disease, the sanitarian, whether lay or medical, had to stumble along, following the great principle that cleanliness is a sure guide to health—cleanliness personal, domestic, municipal, and national; cleanliness in breathing and eating and drinking; cleanliness of air and soil and water and food. In fighting typhus fever the measures used were air and light and disinfection and isolation. Even yet the *contagium vivum* of typhus is not certainly known, but we have learnt that its ordinary way of dissemination is by lice; that all those means which were so blindly yet trustfully followed in the past were inimical to body vermin, and therefore to the conveyance of typhus. Even in the domain of modern surgery cleanliness is the very essence of asepsis, and in the old days a surgeon who was instinctively and empirically clean in all the details of his work could achieve great results.

In enteric fever the same principles apply. Sir George Newman, before discussing the factors which have led to its decline, urges that the disease shows little or no evidence of marked change in symptomatology, severity, fatality, or epidemiological type. He then proceeds to state five principal causes of diminution of prevalence, which he sets in the following order—improved water supply; prompt removal of faecal matter and house refuse; hospital isolation and treatment; advance in public education in personal and domestic hygiene; and, lastly, purity of food. Improved water supply was a large factor in the irregular diminution of enteric fever prior to 1900, and has had a share also in the more recent decline, but so lately as 1921 a local epidemic of 397 cases and 45 deaths was traced to an inadequately guarded supply. Wherever such conditions still exist, access of the bacillus to the water, and its multiplication there, may cause a similar calamity. The immense improvement which has taken place in the water supply of densely populated industrial areas has indeed had a tremendous effect in the reduction of enteric fever. But in addition the piping of this supply along streets and into dwellings has made possible the water-carriage system of excreta removal in substitution for the dry privies which so long prevailed. These, with their accompanying middens in the backyard of every house in urban districts, not merely conveyed specific infectious disease, but polluted the whole atmosphere of crowded localities, and so, it is not unreasonable to believe, lowered the general health of the population. Daily scavenging and refuse removal are the ordinary accompaniments of the water-closet system, and are of first-class importance in every scheme of public sanitation. Closely related to scavenging is the diminution of the fly nuisance, with the risks of disease conveyance it entails.

To the same category belongs the higher standard of personal and domestic hygiene to which Sir George Newman calls attention. Education of the public has unquestionably played its part in the control of enteric fever, and in diminution of sickness and mortality. Much—very much—of course, remains to be done, but the intelligent and informed co-operation of the layman in the work of the health authorities and of the medical profession is of real and increasing value, though that value cannot be stated in percentages.

Purity of food, which Sir George Newman places last in his list, though with no suggestion that it is also least, finds its place more naturally here. The importance of clean milk is now universally recognized alike by health officers, by local authorities, and by almost the whole community, for that knowledge is penetrating even to the slums. Tuberculosis is of much more importance than enteric fever in this connexion, and natural impatience at the slow progress made in the healthy housing of cattle and the eradication of bovine tuberculosis has led, especially in America, to the adoption of a short cut—pasteurization—towards elimination of the danger. The part played by shellfish in conveyance of enteric fever was demonstrated in the classical investigations of the late Dr. Timbrell Bulstrode, whilst more recently Sir William Hamer

has shown how the use of immature and ungutted plaice from the estuary of the Elbe caused enteric fever in London until the war stopped the supply.

Next, following our own order, we come to isolation of cases of the disease. Enforcement of removal to hospital was at one time denounced as an infringement of the liberty of the subject, but that cry has not been heard for many a year. It is true that resort to isolation is a confession of failure to prevent the disease by prior measures, but the practice has been, and is, of the utmost value, both for the public and the patient. Destruction of infective material can be secured in hospital with a thoroughness which is rarely, and only with much trouble and difficulty, achieved in the house of the patient, especially in the houses of the poor. But when the isolation hospital movement began on a large scale a generation ago, it was generally, if not universally, assumed that with the aid of proper disinfection before discharge a patient who had recovered from the definite illness caused by his infection could, after several weeks' detention, be safely sent out free from all risk of spreading the disease. That belief has been shattered by observation, and, especially in the case of both enteric fever and diphtheria, by bacteriological investigation. Yet with fuller appreciation of the limits of the value of hospitals there is no thought of dispensing with them. The patient can be much better treated there than at home, and has a much greater likelihood, not only of recovery, but of freedom from the sequelae of his infection, while at the same time the risks of spreading the disease are greatly diminished.

Finally, throughout the entire sphere of preventive medicine the task of the administrator is constantly made easier by the aid he receives in his field work from the laboratory science of bacteriology. It has revealed the specific causes of many diseases, both at home and in the tropics, it has largely dissipated his old-time fear of the air of sewers and drains, it guides him in judging the safety of water and milk and foods, it tells him when apparently healthy individuals are potential carriers of various infections, and it gives invaluable direction in the whole region of individual immunization. General sanitation and individual immunization should both be utilized to the fullest practicable extent—the former mainly for improving environment and raising the average health so far as that is under the influence of environment, the latter for protecting the individual against dangerous diseases which sanitation has not been able to overcome—some of which, indeed, appear to be almost or quite outside the sphere of its influence.

THE ETIOLOGY OF CHRONIC ULCERATIVE COLITIS.

PAST investigations into the cause of chronic ulcerative colitis have not yielded results at all convincing. The disease is characterized by intractable bloody diarrhoea, continuous or intermittent, producing severe debility and often anaemia and fever. Starting in the rectum or lower part of the colon—where, indeed, it may sometimes remain localized for months or even years—it spreads upwards, sometimes as far as the caecum or rarely into the ileum. The colonic mucosa appears inflamed, granular, and oedematous, bleeding easily and breaking down into ragged confluent ulcers which may be superficial or penetrate deeply. Most of the organisms that have been implicated in the infection are ordinary inhabitants of the intestinal tract—the colon bacillus, proteus, pyocyaneus, gas bacilli, streptococci, and so forth. The pneumococcus has been held by some to be the causal organism. More recently the idea has been put forward that the condition follows a previous infection with dysentery bacilli, which, disappearing, leave the secondary invaders to maintain the chronicity of the lesions.

Bargen of the Mayo Clinic[1] has isolated from the ulcers an organism somewhat resembling the pneumococcus, which is capable of reproducing in animals the main features of the disease. He had endeavoured, without success, to find dysentery-like bacilli, but discovered instead in smear preparations from the bowel lesions large numbers of Gram-positive diplococci mixed with less numerous Gram-negative bacilli. Ordinary plating methods failed to isolate these diplococci, the bacilli—in all probability the colon bacillus and other saprophytes—masking or preventing their growth; but by the use of Rosenow's medium (glucose brain broth) in long test tubes, thus affording a gradient of oxygen tension, the diplococci were obtained in predominance in primary culture and could be purified. The condition was studied in twenty-two patients suffering from the disease—sporadic cases occurring in civil life, in whom no dysentery bacilli, tubercle bacilli, or amoebae had been discovered in the routine examination of the stools. For the purposes of the bacteriological research the patients were given a castor-oil purge in the evening and a cleansing warm-water enema in the morning immediately before examination. Through a proctoscope sterile swabs were applied to the ulcers or inflamed mucous membrane, and transferred to the warm culture medium. The diplococci were Gram-positive, plump, mostly lanceolate, about the size of pneumococci, not forming capsules, and with little tendency to grow in chain formation. They differed from the pneumococcus and the faecal streptococcus in giving no reactions with inulin and mannite. Healthy rabbits were injected intravenously with cultures derived from each patient, receiving either 2 to 5 c.cm. of twenty-four-hour cultures containing the diplococci in predominance or 3 to 8 c.cm. of pure diplococci. In from twenty-four hours to several days the animals developed violent diarrhoea, often with blood and mucus, and wasted rapidly. The seat of election of the lesions, ranging from scattered petechial haemorrhages and extensive submucous ecchymoses to superficial ulcers of the mucosa, was in the colon from the rectum upwards. In many instances only the lower part of the colon was affected, the most extensive lesions beginning at the anal mucocutaneous junction. In certain rabbits the condition extended to the caecum and in a few to the lower ileum, but only rarely higher. This selective localization after intravenous injection is specially interesting in view of the fact that similar injection of streptococci or other organisms isolated from acute appendicitis, though sometimes resulting in lesions of the small intestine, is practically never followed by infections of the large bowel. With this particular microorganism no lesions were to be found outside the bowel. Of 190 rabbits injected, 56 developed lesions, 45 of these having had mixed cultures of diplococci and coliform bacilli, and 11 pure cultures of the diplococcus. In the main the lesions were more extensive and the diarrhoea more severe in the case of the mixed injections, but the administration of pure cultures of the Gram-negative bacilli killed the animals within twenty-four hours without producing bowel lesions. In addition to the 56, 23 others developed diarrhoea but no

[1] *Journ. Amer. Med. Assoc.*, August 2nd, 1924, p. 332.

gross lesion of the large intestines. Of the 56 injected with diplococci isolated from 15 different patients, 38 had diarrhoea and many of them passed blood and mucus; 23 died, and the rest were killed at periods varying from one day to twenty-eight days; all had mucus and haemorrhagic matter in the colon, even though there had been no diarrhoea. In several cases Gram-positive diplococci were isolated in pure culture from the mesenteric lymph glands, although mixed cultures had been injected intravenously. Sections of the ulcers produced showed diplococci in the depths.

The lack of more numerous controls is the weak spot of the investigation: bowel cultures were taken from only four patients not suffering from chronic ulcerative colitis, and yet similar diplococci were recovered from one of these cases; these diplococci, on injection into a rabbit, produced diarrhoea and petechial haemorrhages in the colon. Nevertheless the lesions produced experimentally in the rabbits by intravenous injection of the diplococci bear a very striking resemblance to those occurring in the human subject in their localization, progress, and extent, and give grounds for believing that the problem of the etiology of the disease is on the way to solution. Bargen had an opportunity of using a vaccine prepared from the mixed cultures on five patients, and records that four of them were improved. Anything which will curtail or cure this intractable malady is to be welcomed.

LONDON'S WATER SUPPLY.

SIR ALEXANDER HOUSTON'S eighteenth annual report on London waters (for the year ended March 31st, 1924) has just been published.[1] A regular reader of these yearly volumes cannot but be impressed with the number and variety of the problems calling for the consideration of the director of water examination, and with the real enthusiasm and energy exhibited in the performance of the work. The circumstances of the supply account for the difficulties which have to be faced. The needs of the metropolis are not met by gravitation from a single great lake receiving the rainfall of a remote and unpopulated upland area yielding water of stable composition and natural safety. That would have been the kind of supply which the mountains of Wales would have provided if the scheme submitted to the committee presided over by Lord Balfour of Burleigh many years ago had been approved. That proposal, however, was rejected, and it cannot be denied that some of the fears which prompted it have not been realized. Though there have been times of scarcity, with some restriction in the watering of gardens and the washing of motor cars and so forth, there has never, not even after a sequence of dry years, been a real water famine. Neither has the metropolis been afflicted with epidemics of water-borne enteric fever, though its water is taken from rivers liable to risks of contamination from human sources—rivers differing from each other in the problems they present, each of them also with its own seasonal variabilities which have to be dealt with. The fact is that the Metropolitan Water Board and its director have risen to and been able to deal very successfully with the difficulties of their great task. It is not our purpose this year to follow Sir Alexander Houston, even briefly, through the sixteen sections of his report. He begins by discussing chlorination of Thames water and New River water, as well as superchlorination and dechlorination. The use of chlorine, let it be remembered, originated with conditions of dangerous water supplies during the great war, and the world has now the benefit of what Britain in particular has discovered of its value. America especially has adopted chlorination to an extent far beyond that reached in the country of its origin. The questions which are now being considered in the light of experiment and experience relate to dosage, taste, cost, and details of methods. The suspended solids in the raw water of the Thames amounted in one week last January to nearly a quarter of a ton in every million gallons, and four-fifths of it was non-volatile. On such occasions intakes have to be closed against its admission to the supply. The different reaction of different waters to filtration of suspended matters presents important practical problems as to the taste of the waters, and differences between Chelsea stored water and West Middlesex water are reported on. Waters, of course, are examined previous to treatment, and are chlorinated or stored or both before sand filtration is begun, so that when the filtration stage is reached the water has been improved from ten times up to a thousand times as judged by the colon bacillus test. Experiments with rapid filtration were also carried out to save the heavy work of slow sand filters, and to eliminate cost. Effort has been made to frighten sea-gulls from the West Middlesex works, apparently only to prevent pollution by their droppings. But there may be an additional reason. Though sea-gulls are not known to suffer from water-borne disease, yet if dumping grounds for town or domestic refuse are at hand the gulls may grub among these, and afterwards carry filth to a neighbouring reservoir. Other subjects dealt with are the permanganate test and the condition of the Thames as regards dissolved oxygen, and the very remote possibility of the tidal portion ever being so pure as to allow the Thames again to become a salmon river. The permanent hardness of the water of the Lee, especially in winter, is discussed, not as being important in respect of health, but as it affects manufactures and trades such as laundries. It will be seen from these notes that the report, as usual, treats of many matters of interest and importance to London.

[1] Fcap, pp. 89, with plates and diagrams. P. S. King and Son. Price 15s.

THE PARATHYROIDS.

THE sixth supplement of the *Acta Medica Scandinavica* is devoted entirely to Dr. Salvesan's studies on the physiology of the parathyroids.[1] The problem of the function of these glands is still unsettled, and at the present time three theories are held as to the cause of the symptoms of parathyroid insufficiency—namely, that they are due (1) to an intoxication, (2) to alkalosis, or (3) to calcium deficiency. The first of these is that most widely accepted, and in a recent communication (Dragstedt and Peacock, 1923) the function of the glands is held to be the prevention of intoxication from the intestines. The alkalosis theory does not seem to have found much support. Doubt was thrown on the calcium deficiency theory through the observation of Joseph and Meltzer that the symptoms of tetany could, contrary to expectation, be checked by the injection of sodium chloride, which is known to increase muscular irritability. The objection, however, is merely apparent, since the symptoms were checked only by large doses of chloride, and Loeb has shown that with such doses (or when the Na:Ca ratio increases to a certain extent) muscular irritability is lost instead of being increased. The earlier investigations on the metabolism in parathyroidectomized animals were almost entirely centred upon the acute period of tetany. No studies were made of changes in the blood chemistry and metabolism of animals suffering from chronic tetany, or in the latent tetany of partially ectomized animals, and it is to these problems that Dr. Salvesan has mainly turned his attention. He

[1] Studies on the Physiology of the Parathyroids. By Harald A. Salvesan, M.D. (from the Physiological Institute, University of Christiania). *Acta Medica Scandinavica*, Supplementum VI. Lancaster, Pennsylvania: Intelligence Printing Co. 1923. (Roy. 8vo, pp. 159: 17 figures.)

planned to study the blood chemistry and the nitrogen and carbohydrate metabolism in animals from which three glands only had been removed; and also to perform complete excision and endeavour to keep the animals alive by calcium treatment. He found that after complete excision dogs could readily be preserved by large doses of calcium chloride; after a time the doses could be lowered and finally stopped, milk alone sufficing to maintain a normal condition of health. The possibility of the existence of accessory glands could not be excluded; but it was observed that the blood calcium remained low persistently after total excision, which would probably not have been the case if the recovery had been due to compensatory hypertrophy. Low blood calcium is significant also because it characterizes latent tetany in contrast to cured tetany. In no instance did the animals show any symptoms of tetany after partial thyroidectomy. As the result of his observations, the author concludes that all the symptoms following parathyroidectomy are due to calcium deficiency, and that an increase of the Na:Ca ratio is the cause of tetany in animals operated on and in infantile tetany. It has recently been demonstrated that prolonged forced respiration also produces typical symptoms of tetany; this had been attributed by some to alkalosis, but by others, with greater probability, to anoxaemia, due partly to stabilization of the oxyhaemoglobin by the alkaline reaction. Gastric tetany still remains unexplained; the ratio between sodium and calcium is not altered, and there is no change in the reaction to the alkaline side. There thus appear to be three etiological factors in the production of tetany: (1) increased sodium-calcium ratio, (2) anoxaemia, and (3) pyloric occlusion with loss of hydrochloric acid. Blood analysis during acute tetany showed that the blood sugar was unchanged, the alkali reserve almost invariably decreased, the calcium always reduced below 7 mg. per cent., usually much lower, and the inorganic phosphorus of the blood serum increased. In dogs with latent tetany on a milk diet the blood calcium was lower than normal, the protein metabolism normal, and the blood sugar unchanged. Spontaneous glycosuria was never observed. There was a marked relation between the glucose tolerance and the blood calcium, the tolerance being low when the dogs had tetany and a low blood calcium, and rising with calcium feeding. In a dog subjected to partial parathyroidectomy which did not present symptoms and with normal blood chemistry, guanidine injections, in amounts large enough to produce violent convulsions, did not alter the serum calcium, but produced hyperglycaemia and lowering of the alkali reserve; guanidine therefore acts as an independent convulsive poison.

THE WORK OF AN ALMONER'S DEPARTMENT.

In the report for 1923 of the Social Service Department, Samaritan Fund, and Northcote Trust at St. Thomas's Hospital, the lady almoner again calls attention to the ideals of her department in linking the hospital with the patients' homes, in co-ordinating the efforts of the medical and nursing staffs with the resources for help of the community, and in representing the homes of the patients in the hospital and the hospital's activities in their homes. The Charity Organization Society, the Invalid Children's Aid Association, church relief committees, and guilds of help are among the outside agencies from which the almoner obtains advice and assistance. The co-operation of the hospital staff is most sympathetic; and the value of investigations such as that now being carried on into the prevalence and causes of rheumatism and chorea in children will, it is thought, be increased by inquiries made by the lady almoner's department into home conditions. The almoner reports that in the casualty department there has been a marked increase in the number of patients presenting themselves for treatment who are in no way suitable for charity. It appears that most of these people have no intention to deceive, and readily admit that they can pay for treatment. Their motives seem to be, the reputation of the hospital for efficient treatment and the desire to help to relieve the hospital of debt by paying for the attention received. In the specialized out-patient departments the work of the almoner is heavy. The home of every patient applying for treatment of tonsils and adenoids is visited, and if the conditions are unsuitable arrangements are made for in-patient treatment. A number of difficult and maladjusted children are investigated, and some are sent to suitable homes for a change of surroundings. Convalescent children are sent to various institutions. In the children's venereal disease clinic attempts are made to ensure regular attendance, but the number of defaulters remains very large. The orthopaedic cases involve much work in finding suitable convalescent institutions, keeping surgical apparatus in repair, and instructing parents. The almoner's department finds outlets for its energies in advising in workmen's compensation cases, in visiting chronic ophthalmic cases, in the after-care of mental cases, and in tracing the causes of stammering and other speech defects in patients attending the speech clinic. In the female venereal disease department, though many patients still slip away before being discharged by the medical officer, the almoner carries on educative activities, consoles and sympathizes with innocently infected married women when they realize the truth as to the cause of their sufferings, and finds homes or occupations for some of the girls, many of whom have become "fed up" with domestic service. In their case the almoner often realizes how dull and monotonous is the respectable work that she has to offer, though owing to the girl's education and outlook it is all for which she is fitted. May it not be suggested, as a consolation to the lady almoner, that to many of these girls any kind of respectable work would be dull and monotonous? The Northcote Trust has a home for women and girls suffering from venereal disease, at which treatment and training are given. The girls who have been especially difficult to deal with have nearly all been found to be mentally defective to some extent. Under the trust help is also given to patients who ought to be admitted to the hospital but need help to enable them to leave their homes. The Northcote Trust is responsible for the after-care of all patients; it has now taken definite responsibility for the patients under treatment by insulin, and it helps cancer patients to whom the hospital can no longer be of any benefit. During 1923 the demands on the Samaritan Fund increased from every department of the hospital, but with the help received from other institutions no recommendation was refused on financial grounds. The greatest difficulties of the lady almoner in dealing with the cases under her care have arisen from house shortage and unemployment. The report is an excellent summary of most beneficent work.

MOTOR-CAR AND STREET LIGHTING.

A most suggestive paper on illumination of highways from the motorist's point of view was read at the conference on illuminating engineering at the British Empire Exhibition on August 12th by Mr. Edward H. Fryer, head of the road department of the Automobile Association. The motorist's requirements, he said, fell into three groups: his own installation, the street lighting, and warning lights. The most satisfactory form of lighting for a motor car was by electricity. There should be two headlights, the nearside focused straight ahead, and the offside focused slightly towards the nearside. There should be an auxiliary light under the nearside dumb iron as low as possible and focused on the edge of the road (when driving a yard or so

from the edge) at a distance of eight to ten yards ahead of the car. These three lights should be controlled by a couple of switches handy to the right thumb, and not on the left-hand side. Of the two side lights the nearside one should be focused with a horizontal beam and the offside one depressed so as to avoid dazzling traffic. The single tail light should be on the offside. A national standard for street lighting was, he thought, desirable, for the reason that traffic on the roads at night is sure to increase. Illumination of the road surface, of the footways, and road junctions and crossings, should be even; glare or dazzle from naked lights should be avoided, and shadows also, for they are disconcerting, and encourage the use of excessively powerful headlights. The lights should be at a uniform height and equally spaced, especially on undulating and winding roads. Danger and street signs should be illuminated, and auxiliary lights should be fitted to standards to obviate risk of impact. His ideal of street lighting would be obtained from lamps fitted with parabolic reflectors projecting a strong beam in the direction of proceeding traffic, but fixed at such a height and angle as not to dazzle drivers on the other side of the highway proceeding in the opposite direction. A fixed danger light, if red, is a danger in itself, for most drivers took it to be a tail light and proceeded to pass on the offside; a fixed light should be green, as at Buckingham Palace, then there was a clear indication that it was to be passed on the near-side. Mr. Fryer did not deal with the character of the motor lights or of the glass or lenses covering them, or suggest any methods whereby pedestrians might be protected from the terror of the sudden glare of an oncoming car.

THE NATURE OF ANTISCORBUTIC VITAMIN.

THE antiscorbutic vitamin is the least stable of all the vitamins, and hence the investigation of its chemical nature is even more difficult than the investigation of any other of these elusive substances. Work done recently at the Lister Institute by Zilva[1] and Connell[2] shows, however, that the antiscorbutic vitamin is of fairly simple chemical nature, and that its molecule is approximately the same size as that of dextrose. Other experiments suggest that this vitamin does not contain nitrogen, and that very possibly it does not contain phosphorus either. The amount of the vitamin required to protect a guinea-pig from scurvy is less than 0.5 mg. (1/120 grain) daily. The antiscorbutic vitamin appears therefore to be quite a simple organic compound and to exert its action in extremely small doses. It is, however, very easily oxidizable.

THE PROFESSIONAL CLASSES AID COUNCIL.

THE annual report for 1924 of the Professional Classes Aid Council states that this organization began as the Professional Classes War Relief Council, and that during six years it dealt with 12,000 applications for help. It provided maternity homes for the wives of professional men; it gave educational assistance to nearly 900 children; it helped to save many hundreds of homes from ruin. Distress among the professional classes did not end with the war, and the obligation remained to help those who suffer as much as any and make no parade of their sufferings. Representatives of the societies interested in the council—and these include all types of professional men and women—resolved in 1920 that the organization should be continued. The applications that arrive daily prove that there is permanent need for the council's work, especially among those unpensioned sufferers from post-war conditions known as the "new poor." The council's balance sheet shows total receipts of £8,900; most of the amount is obtained by donations and subscriptions; in the list of benefactors the names of many medical men are found. The largest item of expenditure is for the education of children (school fees, maintenance grants, travelling expenses, outfits, and books). Next comes assistance in training; twenty-seven students were helped. Two medical students were helped to pass their final examinations; and two other medical students, two candidates for holy orders, a children's nurse, two matrons, six teachers, one engineer, and one musician are still in training. The council is careful not to encroach upon the functions of the benevolent funds of any profession. A new applicant who appears likely to have a claim upon any fund is always referred first to that fund, and the connexion of the council with the case not infrequently ends there. In many cases co-operation has been arranged for. The year's work has left a deficit of £266, so that the work must be strictly limited unless further aid is forthcoming from the benevolent. The address of the council is 251, Brompton Road, London, S.W.3.

[1] *Biochem. Journ.*, 1924, xviii, p. 632. [2] Ibid., p. 641.

INTERNATIONAL CONGRESS OF RADIOLOGY.

ARRANGEMENTS are being made for an International Congress of Radiology in London next summer. It is proposed that the congress shall be opened on Tuesday, June 30th, and continue for four days of two sessions each, and that visits shall afterwards be paid to provincial centres. The administrative and social centre of the congress will be at the house of the British Institute of Radiology in Welbeck Street. It is hoped that an international committee will be formed by leading radiologists throughout the world, and that the congress will serve to initiate at the Institute a permanent nucleus for international collaboration on radiology and kindred subjects. The secretaries of radiological societies in other countries are invited to form organizing committees and to send suggestions for the programme of proceedings for consideration by the provisional central committee which has been formed in this country. This committee will meet in London early next month to consider the preliminary arrangements. It is hoped that replies, at least in general terms, will then have been received from the societies interested, so that it may be possible to draw up a definite programme and fix the exact date of the congress. All communications should be addressed to the Secretary, International Congress of Radiology, c/o The British Institute of Radiology, 32, Welbeck Street, London, W.1.

WE are informed that the appeal for funds to found the Ross Institute is meeting with a satisfactory response, and that only the difficulty of finding a suitable freehold building to contain the institute and hospital is preventing the work being immediately commenced. The proposal to establish this institute as a memorial of the work of Sir Ronald Ross was put forward in June, 1923. As we announced at the time, the primary object of the institute is to be research, but it will have a clinic, and there must be provision for training others in research. A number of members of the International Medical Conference in Jamaica (p. 376) sent Sir Ronald Ross a telegram heartily approving the foundation of the institute and offering him their warmest congratulations. The committee of the fund has recently issued a pamphlet entitled *The War against Malaria*, containing a short essay by Mr. Wilfred Partington and a foreword by Mr. John Masefield.

DR. J. W. MCNEE, deputy director of the medical unit, University College Hospital, London, is starting for Baltimore to act at Johns Hopkins University as exchange associate-professor of medicine for the coming winter, in the place of Dr. Arthur Bloomfield, who has now arrived in England and will work at University College Hospital.

THE STATE OF THE PUBLIC HEALTH.

SIR GEORGE NEWMAN'S REPORT FOR 1923.

[Second Notice.]

General Epidemiology.

Small-pox.—The net number of cases was 2,504, of which only seven were fatal. The clinical features of mild small-pox are discussed, and an account is given of the Gloucester epidemic of 1923, in which the total number of known cases (698) falls short of the number which actually occurred. The largest number in any one week was 99. Three unvaccinated children, aged 5 years, 10 months, and 6 weeks respectively, died, and an unvaccinated man of 56 died in the small-pox hospital from what was recorded as "cerebro-haemorrhage and delirium tremens." Details are given of a limited outbreak of severe type in London in the summer, which caused two deaths. Eight cases occurred in port sanitary districts, seven of them from infection contracted abroad. Regarding vaccination, Sir George Newman says that in the absence of epidemic small-pox the public has taken dangerous advantage of the exemption facilitated by the Act of 1907. He again directs attention to the gravity of so large a proportion of the child population of the country being unprotected by vaccination, but states that objectors do not usually hesitate to accept vaccination in presence of small-pox.

Enteric fever is referred to elsewhere in our issue to-day, and it will suffice to mention here that the report gives a condensed account of several local outbreaks due to various causes.

Diphtheria.—Under this heading a useful and simple account is given of the *rationale* and success of the Schick test. *Influenza* caused 8,461 deaths in 1923, as against 21,498 in 1922.

Infectious Diseases of the Nervous System.—Cerebro-spinal fever, polio-myelitis, polio-encephalitis, and encephalitis lethargica are considered together at some length. Notifications of the first named show an uninterrupted decline since 1919, and the figure 301 for 1923 is the lowest on record. There were, however, considerably more notifications of the other three than in the previous year; the figures for acute polio-myelitis were 355 in 1922 and 587 in 1923, and for polio-encephalitis 31 and 57 in the two years. Encephalitis lethargica, of which only 454 notifications were made in 1922, rose to 1,025 in 1923. The cases of cerebro-spinal fever were distributed very equally over the four quarters of the year; the largest prevalence of acute polio-myelitis was in the third quarter and the next largest in the fourth; most of the cases of polio-encephalitis occurred in the second half of the year, while the distribution of encephalitis lethargica was just the reverse; its main prevalence was in the first quarter, though it continued to be high in the second. Of the total 1,025 cases of the last-named disease, no fewer than 531 proved fatal. Its clinical features and after-effects are discussed.

Typhus Fever.—Only four cases of typhus fever were notified in 1923, and three of these notifications were subsequently withdrawn, so that there was in England and Wales in 1923 only a single confirmed case of this formerly dreaded disease.

Venereal Diseases.

The total number of venereal disease centres at the close of 1923 was 183 in England and 9 in Wales, a total of 192, as compared with 191 at the end of the previous year. These centres provide approximately 820 weekly sessions—657 in voluntary hospitals, 110 in special premises used solely for venereal diseases, and 53 elsewhere. At 153 centres provision is made for the intermediate treatment of gonorrhoea. The 192 centres are staffed by 380 approved venereal disease officers, 38 of whom devote practically their whole time to the work, or are whole-time officers on the public health staffs of local authorities, giving part of their time to the treatment of venereal diseases. Beds for in-patient treatment are available in connexion with most of the treatment centres; 15 hostels have been provided and can accommodate 263 women and girls. In 1923, 1,045 cases were treated in these hostels—a considerable increase on the 584 cases so treated in the previous year. Ten institutions have been established for the reception of pregnant women suffering from venereal disease, either for ante-natal treatment or for special supervision of confinement. A considerable diminution in the number of fresh infections with syphilis seems to have occurred. The number of cases of gonorrhoea dealt with for the first time at treatment centres during 1923 exceeded the number of new cases in 1922, but was less than in any of the three previous years. It is thought probable that this slight increase does not indicate an increased incidence of the disease, but rather that the improved facilities for the efficient treatment of gonorrhoea have led to a larger proportion of new cases coming to the centres for treatment. The laboratory diagnosis of venereal diseases is carried on in 73 approved laboratories, which are regularly inspected by a medical officer of the Ministry, who discusses various problems, including the possibility of errors resulting from modifications in test methods. In one case it was found that a modification introduced had resulted in definite loss of delicacy in the test, and arrangements have now been made for the services of a pathologist who will carry out comparative investigations in other cases of variation from standard methods, with a view to ascertaining the effect of apparently trivial alterations in method, and to preventing the premature cessation of treatment. The comparison of various tests for the sero-diagnosis of syphilis is receiving the careful attention of the Ministry, which has taken part in international conferences on this subject in December, 1921, and more recently in Copenhagen at the end of 1923. The conclusions of this last conference were broadly that the Bordet-Wassermann test cannot be replaced at present by the flocculation tests.

Maternity and Child Welfare.

There was a slight decrease in the number of deaths from puerperal sepsis, which caused 985 out of 2,892 maternal deaths. Haemorrhage was the second most important cause of maternal death (432), puerperal nephritis, albuminuria, and convulsions came third in order (418), and other accidents of childbirth came fourth (304). In 1922 there were more deaths from eclampsia, etc., than from haemorrhage. A report on maternal mortality, compiled by Dr. Janet Campbell, the Ministry's senior medical officer for maternity and child welfare, was issued last spring, and was reviewed in our columns of April 5th (p. 637). Dr. Campbell pleaded for an improvement in the quality of professional attendance, with special reference to unqualified midwifery practice, and recommended the provision of more ante-natal centres, maternity beds, domiciliary midwifery, investigation of causes of death, and general social and educational measures. Sir George Newman expresses the opinion that, broadly speaking, the key to the prevention of maternal mortality is efficient ante-natal supervision, which ought to be regarded by doctors and midwives as an essential part of midwifery attendance, and be expected and demanded by all pregnant women. At present 564 ante-natal centres exist; 346 of these are municipal and 218 under voluntary management. Most of them are separate centres or in connexion with infant welfare centres, but some are associated with maternity homes or hospitals; the average attendance is usually small.

The provision of maternity homes has been encouraged by the Ministry of Health for women anticipating some difficulty at the time of confinement, and for those who cannot be confined at home safely and satisfactorily. During 1923 there were, excluding hospitals, 118 voluntary and municipal maternity homes, with 1,442 beds. Of the 17,167 patients admitted, 13,541 were delivered by midwives and 2,935 by doctors. The maternal deaths in these homes numbered 76—in part due, it is suggested, to insufficient ante-natal care; 48 cases of puerperal fever were notified, of which 12 were fatal; there were 472 deaths of infants within ten days of birth, including stillborn cases, and 72 cases of ophthalmia neonatorum. Nearly all these

maternity homes provide only for confinements, the admission of pregnant women needing observation or treatment for abortion or miscarriage, or of infective cases, being usually impracticable. It is stated in the report that the Minister of Health favours the establishment of maternity homes by the larger local authorities, such as county councils and county borough councils, rather than by small maternity and child welfare authorities; and it is added that for efficient and economical administration maternity homes should contain not less than from twelve to twenty beds. Although the number of infant welfare centres has increased only slightly (from 1,946 in the previous year to 1,975 in the year under review), the number of women in attendance is certainly greater, and in many areas the centres appear to be seriously overcrowded.

Health visiting is carried on by 3,587 whole- and part-time officers; 1,107 of these are whole-time health visitors employed by local authorities, 891 undertaking only health visiting, whilst the remainder combine this work with other duties under the authority.

For the care of sick infants eleven observation wards, with 101 beds under voluntary management, have been established, and 5 municipal wards, with 36 beds. In addition to these there are 12 babies' hospitals, with 297 beds, under voluntary control, and 10 municipal hospitals, with 225 beds, making a total of 38 institutions, with 659 beds. The observation wards are mainly intended for babies who are not thriving, and their mothers are encouraged to attend in order to learn correct methods of infant management. Day nurseries are provided in certain areas for children of women who are compelled to go out to work. The Ministry contributes grants to 110 of these day nurseries, 88 of which are voluntary and 22 municipal; together they have accommodation for 3,624 children. Healthy children are received for residence in 5 other nurseries, usually for short periods during the illness or temporary absence of the mother. More permanent care than is available in a resident nursery is provided by 31 homes for healthy children; and they accommodate 792, all but one of which are on a voluntary basis. For unmarried mothers and their babies 103 homes exist, with accommodation for 1,395 mothers and 1,316 babies; of these homes 102 are voluntary and one municipal. It is recommended in the report that whenever possible the mother should be allowed to undertake day work while living at the home, so soon as she is fully restored to health, the baby receiving such supplementary feeding as may be necessary. In this way it would often be possible to overcome the present difficulty of persuading young women to remain as long as they should in these homes.

THE INSURANCE MEDICAL SERVICE.

The part of the report dealing with the Insurance Medical Service begins with a generous appreciation of the place occupied by the insurance system in the domain of State medicine. One of the chief aims of the service, it is claimed, is to preserve the intimate relation of doctor and patient, which finds expression in the phrase "the family doctor." That it does not provide more than the services of general practitioners is because the scheme of consultant services, for which funds were voted by Parliament in 1914, foundered in the great catastrophe of the war. But the practitioner is not an isolated medical unit, and is urged to maintain close touch with workers in his area who are engaged in other fields of medical duty—that is, with the medical officers of health, with the staffs of voluntary hospitals, and with voluntary nursing associations. Record cards show that the insurance practitioner gives to his patients attendances about three times as numerous as those stated in the Plender Report to have been given in private practice, so that he has greater opportunities to see, in their earliest stages, illnesses which may constitute the beginnings of serious disease. In certification of incapacity for work the insurance medical practitioner has a serious and responsible duty, and also in the keeping of medical records as a basis for information concerning the incidence of disease and its results. His relation to his patients also gives him the opportunity of being an educator in health. The number of insurance practitioners in England and Wales in 1923 was, it is stated, 12,855, and the average number of persons on each list was 992. Only 2.1 per cent. of practitioners had more than 3,000, and in no such case did the doctor work single-handed. Less than 14 per cent. had 2,000 on their lists and many of them had assistants. It is calculated that a list of 2,000, with 300 working days, would give an average of about 8 visits and 16 surgery attendances for each working day. Over 1,000 approved societies have devoted part of their surplus funds to schemes of additional "treatment benefits," of which dentistry is the most popular.

Regional Medical Officers.—The number of cases referred to regional medical officers during 1923 was 146,381, an increase of 29 per cent. over the previous year. Of these, 144,556 were referred by approved societies, 542 by Insurance Committees, and 1,283 by practitioners. Of the total, 60,261 declared off the funds without waiting for examination, 22,371 were found not incapable of work, and 63,402 were found incapable. Less than 44 per cent. of the original number, therefore, remained on the roll of the incapacitated. The regional officers made 5,903 visits for inspection of medical records, and the improvement recorded in the previous year was found to be maintained. The officers also made 4,401 inspections under the Dangerous Drugs Acts. The value of the regional staff is highly spoken of in the report.

Disciplinary Cases.—Insurance Committees, through their medical service subcommittees, investigated 500 complaints against doctors. In 107 of them the Minister decided to withhold varying amounts of the grant. Grant was also withheld in 24 cases in which records had not been kept, and in 20 cases where practitioners had failed to furnish necessary information to the regional medical officer. In 23 complaints against practitioners appeal against the Insurance Committees' decisions was made to the Minister. The appeal was allowed in 6 cases, dismissed in 13, and the committee's decision was varied in one case. Three practitioners appealed against findings of extravagant prescribing; one appeal was allowed, and in the other two the surcharge was reduced. Insulin is provided to insured persons as in the case of other "proper and sufficient medicines."

THE POOR LAW MEDICAL SERVICE.

Medical assistance under the Poor Law is provided either as domiciliary or institutional treatment by the 650 Boards of Guardians in England and Wales. The average population of a Board's area is close on 60,000, but the actual number varies from nearly a million to less than 10,000. Medical relief districts, each with its medical officer, have an average population of not over 15,000 and an average area of not over 15,000 acres, but there are wide variations. Some populous urban districts have dispensaries where the medical officer attends and drugs and dressings are supplied. District medical officers number about 3,500. Their work has been affected by the insurance service, and by development of institutional services. Separate infirmaries under the Poor Law can accommodate over 36,000 patients, and other institutions can take well on to 84,000. In this total institutions for mental cases are not included; they can accommodate 12,000 patients. Some institutions are allocated to children, others to special diseases. Large institutions have, as a rule, whole-time medical superintendents, with assistants, and in some places consultants and specialists. A large proportion of cases are "aged and infirm," but certain Poor Law infirmaries differ little from voluntary hospitals. There is a growing tendency to associate such infirmaries with medical schools. Some extension has taken place in 1923 of the practice of admitting "paying" patients for whom fixed inclusive sums are contributed. Such cases must be technically "destitute"—that is, unable to meet expenditure necessary for the treatment they require. As yet, however, these developments do not play a large part in the service. Considerable attention was devoted during 1923 to the arrangements available in the Poor Law infirmaries for the training of nurses, under the Poor Law Institutions (Nursing) Order, 1913. At the end of 1922, twenty-six London infirmaries and fifty-nine provincial had complied

with the requirements of the Order, and twenty-five other provincial Poor Law institutions were specially recognized. All the recognized training schools have sought formal approval from the Nursing Council, and very nearly all have obtained it. There is much to be said for committing the supervision of breast-fed and bottle-fed infants, if not all infants, to the infirmary staff rather than to the workhouse staff.

Provisional conclusions from three years' medical inspection are stated in some detail. The work of district medical officers is not so closely linked up with that of the infirmaries as it might be for administrative purposes; little fault is to be found, it is said, with the provision for the sick in the large infirmaries, but many of the smaller institutions, especially rural, are not beyond criticism; sometimes busy practitioners devote too little time to infirmary patients. It is considered that the classes of patients are too numerous to be dealt with in a single institution of moderate size, that areas for institutional provision should, therefore, be enlarged, and that greater use should be made of the consultant staff in many infirmaries. Finally, the medical service should be such as to attract to it men and women equal to their high task.

MEDICAL INTELLIGENCE AND INTERNATIONAL HEALTH.

An important section of the medical department is concerned with the collection from home and foreign sources of "all available medical information, whether of an administrative, legislative, statistical, epidemiological or technical nature, which may assist the Ministry in meeting its obligations in national and international public health affairs"; it distributes what it receives to those concerned. It forms a connecting link within the department and with other departments. It supplies the League of Nations with information of colonial notifications of disease, and in 1923 took charge of the reception of medical visitors from other countries. Office committees continue to be appointed on public health questions, and committees are now dealing with the supply of insulin, food preservatives and colouring matters, and the co-ordination of the Rockefeller School of Hygiene with other institutions. Many reports and memorandums have been published on subjects of medical interest. At the Ministry's laboratories pathological work has been continued and reports issued, whilst close co-operation has been maintained with the Medical Research Council. The results of special inquiries have been set out in reports which have been noted in our columns. International health work has related, among other matters, to the prevention of epidemics, the proper and gratuitous treatment at seaports of seamen of all nationalities suffering from venereal disease, the international standardization of serums and certain other remedies, international understanding in regard to vital statistics, and international studies of certain diseases.

FOOD AND NUTRITION.

After some general observations on the study of nutrition and the evil effects of undernutrition on the individual and public health, we are presented with a fairly full account of the present position and control of the milk supply. This is a subject to which a great deal of space has been given in the JOURNAL during the last few years, and as recently as August 2nd (p. 205) we published a notice of the monograph by Dr. Stenhouse Williams of the National Institute for Research in Dairying, at Reading, which has been issued by the Ministry of Agriculture.

Milk.

Sir George Newman expresses the view that the consumption of milk should be increased, and observes that to attain this object the milk should be attractive and appetizing, of good keeping qualities, and of recognized economic value. "The consumer," he says—and he puts his statement in italics—"can control his milk supply by his demand; the trade have shown that they can meet his demand; the local authority in every area should see that they do." He describes the method of grading the higher qualities of milk to be sold under special designations. The number of producers and retailers holding licences under the Order with regard to the grading of milk has increased in a remarkable way since 1920. Reference is made to the pasteurization of milk, a subject upon which Dr. Hamill made a report, noted in the JOURNAL last year (vol. ii, p. 292). It is stated that manufacturers of dairy appliances have manifested considerable activity and ingenuity in devising apparatus which will enable the process to be carried out strictly in accordance with the Order issued by the Ministry of Health, but Sir George Newman considers it too early for useful comment on what has been done.

Meat Inspection.

This section of the report contains also observations on meat inspection, a subject to which we referred at some length last week (p. 332). It is stated that of the total imports of meat into this country Smithfield market received 34.3 per cent. of the beef, 39.2 per cent. of the mutton, and 53.5 per cent. of the pork; in addition a very large quantity of home-killed meat passes through the market. The following table is given showing that while the amount of British meat passing through Smithfield market in the year 1923 was only one-fifth of that derived from foreign countries, the quantity of diseased meat in the home-killed carcasses was nearly twice as great as that found amongst the imported meat.

Meat dealt with in Smithfield Market during the year 1923.

	British.		Imported.	
	Total Amount. (Tons.)	Amount Diseased. (Pounds.)	Total Amount. (Tons.)	Amount Diseased. (Pounds.)
Beef	43,514	53,894	219,783	38,448
Mutton	19,209	23,481	115,065	20,994
Pork	14,118	94,509	27,303	35,069
Total	76,841	171,884	362,151	94,511

With this table there is quoted from the report of Dr. Howarth, medical officer of health for the City of London, a statement by Mr. Dunlop Young suggesting that these statistics show that there has been no improvement in the inspection of meat in country districts. The regulations now issued in Scotland, as related in the article published last week already mentioned, are calculated to diminish this reproach, and the Ministry has already recommended that the Scottish rules should be followed by meat inspectors in England and Wales.

Food Poisoning.

During 1923 a considerable number of outbreaks of illness attributed to food were investigated by local medical officers of health with the assistance of medical officers of the Ministry. Bacteriological examinations were carried out for the most part by Mr. Bruce White, B.Sc., in pursuance of arrangements made by the Ministry and the Medical Research Council in 1921. In future this work will be conducted in the pathological laboratory of the Ministry. Canned foods were responsible for seven outbreaks; three were attributed to canned beef, three to canned salmon, and one to canned tongue. In none of these was a living food-poisoning organism discovered, and the symptoms were therefore attributed to the existence of bacteriological toxins in the food. Four small outbreaks were reported in which organisms of the dysentery or pseudo-dysentery groups were isolated. One outbreak, involving twenty-six cases and two deaths, was due to potted meat, and infection was believed to have been communicated by flies; in this instance Mr. Bruce White isolated from the potted meat and from the organs of the two persons who died an organism closely resembling *B. dysenteriae* Flexner. An outbreak affecting ninety-five persons and involving twenty-nine households in Kent was not explained. It was associated with the eating of shrimps, and the evidence seemed to show that the shrimps became infected after leaving Gravesend, where they were landed. Another outbreak in and about Wycombe seemed to be due to the eating of ice-cream containing *B. aertrycke*. An

outbreak at Harrogate following the eating of cheese was probably due to the existence of salmonella toxins in the food.

FINANCE.

The introduction to the section on local sanitation and environmental hygiene, including port sanitation, is so sound that it must be quoted in full, even if little more is added. It is as follows:

"In the early years of the Medical Department of the Privy Council and of the Local Government Board (1859-1865) it was the practice for the medical inspectors to undertake systematic investigations into the sanitary circumstances of certain districts. This practice followed on the precedents set by the Poor Law Commissioners in 1838 and proved of great value. 'The Medical Department,' wrote Sir John Simon, 'had to develop a scientific basis for the progress of sanitary law and administration.' It took two forms: first, inquiries into the causes and conditions of *excess of disease*, epidemic or endemic; and secondly, inquiries into *sanitation and the necessaries of health*, such as physical surroundings, house accommodation, water supplies, sewerage, nuisances, hospital provision, food supply and industrial circumstances. The records of these sanitary surveys proved to be of classic standard, and they went far to establish not only a basis for legislation but the sure foundation of sound administration. Public health is purchasable, but only in the long run, and only on a true understanding of scientific facts. Merely to send post-haste a medical inspector to visit on a preventive mission an area suffering from an acute and exceptional prevalence of disease is to shut the stable door when the horse has escaped, or attempt to assuage or avoid the attacks of disease by a bottle of medicine. It is neither statecraft nor science. What is needed for the health of a community is that which is needed for the health of an individual, a wholesome and resistant constitution—to be prepared, ready, forearmed. In public health work this means *sanitation*, nutrition, the establishment of immunity, and what Sir John Simon called 'the necessaries of health.' Now, the advance of preventive medicine has in recent years been so rapid, and Pelion has been piled upon Ossa so expeditiously in the attempt to reach Olympus speedily, that it has been found necessary to attend to the immediate demands of the present rather than the sounder process of true prevention. The best practice of all would, of course, be the balanced combination—namely, the maintenance of preparation and the prompt attack. But it must be said quite plainly that the prompt attack has become so insistent, centrally and locally, that its tendency has been to absorb attention. Here, alas! is an epidemic, surely come upon us unjustly and surreptitiously, like a thief in the night. Let us chlorinate the water, disinfect the drains, boil the milk, provide a temporary hospital, or get vaccinated. These are, in all probability, the right and proper things to do under the circumstances, but it would be wiser to be forearmed, and have a wholesome water supply, effective drainage, clean milk, an available hospital and a prepared immunity. When the fire occurs, it is too late to purchase a fire engine or take out an insurance. The experience of each year confirms the view that, both centrally and locally, we cannot afford to neglect the steady application of the bedrock principles of sanitation."

Applying the above principles to the work of the present staff, Sir George Newman writes:

"Certainly the routine claims upon the medical department are only met with some difficulty—many have to be declined, much routine inspection is in arrears, and there is little or no opportunity for systematic sanitary surveys."

The fifth annual report of the Ministry of Health (1923-24) has just been issued.[1] It states that in the estimates laid before Parliament for the financial year 1924 the provision for the health service in respect of grants paid to local authorities has been increased with regard to tuberculosis, both generally (£30,000) and by the erection of cottages for tuberculous ex-service men at village settlements (£15,000), and for the welfare of the blind (£5,000). Reductions are shown in the capital grant towards the provision of sanatoriums for tuberculosis, due to the approaching completion of the programme of building, of the grants in aid of maternity and child welfare, and the treatment of venereal diseases. The report is divided into five main sections, the first of which is public health. Among the subjects of direct medical interest comprised in the report are the control of infectious diseases, maternity and child welfare, the welfare of the blind, the inspection and supervision of food, and some general health questions, including information with regard to international health work. All, or nearly all, the information under these heads has already been noted in our columns on various occasions. The second section is concerned with local government and local finance, the third with the administration of the Poor Law, the fourth with National Health Insurance, and the fifth with the Welsh Board of Health; of all these subjects financial particulars are given, but we have failed to find any general summary.

The second report of the Select Committee on Estimates deals with the Ministry of Health. It states that the net total of the estimates is £19,492,361, as compared with estimates for 1923-24 of £19,599,020, but with an actual expenditure for last year of £17,069,272. In 1913-14 the expenditure was £4,213,375. The main reason for the increase of expenditure is in connexion with housing and the expansion of the health services, which together account for about £14,500,000, to which must be added another £1,000,000 for increased cost of staff. The Committee

"tends to the conclusion that no further serious reduction of staff can be anticipated, but on the other hand that unless further work is thrown upon the Ministry the existing staff ought not to be increased."

This seems clearly not the opinion of the Chief Medical Officer. The need for national economy in every reasonable direction is obvious to the whole nation, yet in the sphere of health it would seem that it can only be achieved if many routine claims on the medical department are declined, if routine inspection is allowed to continue in arrears, and if systematic sanitary surveys are not carried out.

CONCLUSION.

In an eloquent conclusion Sir George Newman sums up the work of what he calls the "record year" 1923. It was a record in respect of low death rate and low infant mortality, and a year exceptionally free from epidemic and infectious disease. He points out, however, that even last year lost time due to sickness, most of which is preventable, probably cost the country "ten times more than that which it loses owing to strikes and labour disputes," and adds: "We are in friendly competition with communities which are giving more public attention to social and health problems than we are ourselves." Far too many deaths occur under 50 years of age. Local authorities should take a wide view of their duties. "The public health is the primary asset of the nation's welfare, whether measured by employability and production, or by length of days, or by personal well-being." The immediate future requires, he says, education of the people in hygiene, concentration on the strongholds of disease, co-ordination and direction of means to ends, and systematic research and investigation. A health programme for local authorities was outlined and circulated in 1919;

"but there are still many authorities . . . and many medical officers of health who have apparently paid no regard to it," and who "still 'muddle on' from hand to mouth, the victims of every passing whim or popular 'stunt,' instead of organizing their work as responsible and competent men, charged with the duty of directing public service of their district on behalf of all who have the fortune, or misfortune, to live within its boundaries."

As to the weaker authorities, he says:

"It is not money they lack, but will power and such careful, economical, and foreseeing co-ordination and direction as the particular needs of each area indicate, the backward authorities striving to emulate the more advanced and enlightened. The progress of the science and art of medicine in the last quarter of a century has, it is true, outstripped the organization of our sanitary, Poor Law, and education authorities. The new wine is being poured into old wine-skins. But what is much more pertinent to our labours, *we fail in hundreds of sanitary districts to use the facilities provided.* On the whole the existing facilities are reasonably well furnished; but all too often people fail to use them, and the authorities fail to co-ordinate them."

In a final paragraph, the Chief Medical Officer records with regret the death of Dr. F. W. Higgs, C.B.E., and Dr. R. J. Reece, C.B. Of the latter he writes:

"I cannot easily express the irreparable loss which the Ministry, and indeed the whole country, has sustained in his sudden death. To his friends and colleagues in the Ministry he was a man greatly beloved for his sterling character, integrity, and personal qualities."

All who knew Dr. Higgs and Dr. Reece will agree with their official chief in his appreciation of their worth.

[1] Cmd. 2218. It is an octavo volume of 184 pages. It can be obtained from the Stationery Office (Imperial House, Kingsway, London, W.C.2) or from the usual Branch Offices and Agents. Price 5s.; postage 2½d. It can also be obtained through any bookseller.

THE BRACKENBURY TESTIMONIAL.

THE following letter has been addressed to the Secretaries of Local Medical and Panel Committees, and it is hoped that all individual subscribers who can attend the proposed soirée, on October 15th, will apply for tickets as soon as possible.

429, Strand, London, W.C.2,
Room 17,
August 12th, 1924.

Dear Sir,

As previously notified, the official date for closing the Brackenbury Testimonial Fund was July 31st. It is desired that all contributions should be definitely in our hands by August 31st at the latest, so that we shall be glad if you will forward to us any further contributions which you may have received, by that date.

It has been decided that the presentation should be made on the evening of October 15th (the night before the Conference of Local Medical and Panel Committees); it will take place at a soirée to be held in London, further particulars of which will be furnished you later.

We shall be glad if you will let us know how many tickets you will require; each ticket will admit a lady and a gentleman.

The Executive Committee has been in consultation with Dr. Brackenbury, and the presentation will consist of a canteen of silver together with a gold watch, and the balance of the Fund will be handed to him by cheque.—Yours faithfully,

HAROLD S. BEADLES,
PETER MACDONALD,
Honorary Secretaries.

EIGHTH LIST—FROM AUGUST 1ST TO AUGUST 15TH, 1924.

Amount previously acknowledged, £5,685 16s. 1d.

A. INDIVIDUAL CONTRIBUTIONS.

£29 1s. 2d.—South Shields practitioners (per Mr. G. Ferguson Shepherd).
£2 2s.—Dr. J. S. Boden, and (per Mr. H. S. Souttar) Sir Humphry Rolleston.
£1 1s.—Drs. D. C. Kirkhope, John Masson, W. R. Wilson.
10s. 6d.—Drs. O. F. Evans, W. E. Porter, A. Paul Swanson.

	£	s.	d.
Total individual contributions ...	37	19	8

B. LOCAL PANEL COMMITTEES.

	£	s.	d.
Brighton Panel Committee—County Borough (per H. Wilfred Aldrich)...	1	1	0
Subscribers: Drs. H. J. Bailey, D. M. Koss.			
Carlisle Panel Committee (per R. Simpson Duthie) ...	5	5	0
Herefordshire Medical and Panel Committee (per John Steed)	4	8	6
Subscribers: Drs. Anderson, Baggs, Harrison and McKean, Powell.			
Huddersfield Panel Committee (per W. H. Smailes) ...	1	1	0
Isle of Wight Panel Committee (per Dr. Reginald John Roberts)	11	2	3
Subscribers: Drs. A. W. Austen, H. F. Bassano, H. B. Billups, F. J. Carter, S. Churchill, J. Cowper, L. P. L. Firman-Edwards, C. Fryer, S. Hartill, A. H. Hopkins, Hutchinson, W. J. Jolliffe, R. H. Jones, K. W. I. Mackenzie, H. V. Mansfield, T. A. Mayo, L. L. Preston, J. W. Pridmore, R. J. Roberts, R. Robertson, A. A. Straton, G. B. Wood, S. L. O. Young, W. H. Frome Young.			
Lindsey (Lincs) Panel Committee (per Dr. H. B. Willoughby Smith)	19	18	0
Merthyr Panel Committee (per E. J. Powell)	20	12	1
Middlesex Panel Committee (per Dr. James Johnstone)	12	12	0
Subscribers: Drs. Emlyn, Cardinall, Abelson, Banes, Farquharson, Yonge, Woolf, John Gordon, F. M. Matheson, Darby, Bailey, Hildige, R. H. Martin, T. Sanders, Brook, G. C. Still.			
Monmouthshire Panel Committee (per Dr. J. D. O'Sullivan)	45	0	0
Montgomeryshire Panel Committee (per Dr. R. D. Thomas)	10	10	0
Northampton Panel Committee (per Dr. C. Mills) ...	8	18	6
Southend-on-Sea Local Medical and Panel Committees (per Dr. R. Sells)	1	1	0
Tynemouth Local Medical and Panel Committees (per Elias Lamble)	10	10	0
Wakefield Panel Committee (per T. Lister Croft) ...	13	13	0
Subscribers: Drs. G. G. Clarke, Donald Downie, S. S. Greaves, T. E. Lister, J. B. Lyle, D. M. Macleod, J. Patrick, D. Purdie, S. Reader, J. J. Reynolds, T. Smith, G. W. Thomas, F. J. G. Tocher, T. Walker.			
Worcester (County of) Panel Committee (per F. W. J. Coaker)	71	4	0
Walsall Local Medical and Panel Committee (per Harry B. Webster)	1	1	0
West Ham Panel Committee (per Dr. Harold S. Beadles)	7	5	6
Subscribers: Drs. Gover and O'Driscoll, Kemp, Harcourt, Weakly, Fairfax, McHardy.			
Wigan Borough Panel Committee (per Dr. F. L. Angior)	17	17	0
Subscribers: Drs. C. F. France, R. Girdwood, J. M. Boyd, W. Readman, J. H. Albinson, G. H. Ormsby, Jas. Oag, E. H. Monks, J. G. Nolan, J. Wood, A. J. Hynd, Hy. Winstanley, J. T. Shirlaw, L. Cooke, T. M. Angior, J. Warburton, J. A. Watson, Jas. Ainscow, Hy. Whitehead, F. Bullough, Alex Mathieson, A. L. Cobban, R. O. Mather, A. R. Erskine, G. A. Sinclair, H. Aspinall, J. B. Macallan, K. Fraser, A. E. Ainscow, Wm. Taylor, C. L. Graham, J. F. Berry, Hy. Litherland, F. L. Angior, J. P. Johnson.			
Rochdale Panel Committee (per Alan H. Richardson)...	19	19	0
Lincs (Holland) Panel Committee (per Dr. J. R. Munro)	10	10	0
	331	8	6

COLLECTED BY THE HONORARY SECRETARY AND TREASURER FOR SCOTLAND (DR. C. E. DOUGLAS).

Individual Contributions.

£1 1s.—Dr. J. S. Craig.
10s.—Dr. J. Broadfoot.

	£	s.	d.
Total individual contributions ...	1	11	0
Panel Contributions.			
West Lothian Panel Committee	16	0	0
Edinburgh Panel Committee	32	6	0
Paisley Panel Committee (second donation)	1	10	0
Renfrew County Panel Committee	18	0	0
Dumfries Panel Committee	11	0	0
	80	7	0
English and other contributions	331	8	6
Total from August 1st to August 15th...	411	16	0
Amount previously acknowledged	5,685	16	1
Total to August 15th (morning)	6,097	12	1

Amounts Promised.

Denbighshire Panel Committee (per George Harrison), £10 9s. 6d.
Glamorgan Panel Committee (per Gwilym Trehearne), £150
Dr. D. McAskie (Southsea), £8 6s. 3d.

England and Wales.

VITAL STATISTICS OF 1923.

THE Registrar-General's *Statistical Review* of England and Wales for 1923, Part I, Medical, has been issued. It is an octavo volume of nearly 500 pages, which can be obtained from the Stationery Office, price 15s. Following a recent practice it has been printed separately from another volume containing the text of the Annual Report. The statistics with regard to births, deaths, and infant mortality were given last week (p. 330) in our notice of the report of the Chief Medical Officer of the Ministry of Health; but it may be added that the natural increase of population by excess of births over deaths was 313,766, which was equivalent to a rate of 8.1 per 1,000 living. This shows an improvement upon 1922, when the natural increase was 293,895, equivalent to a rate of 7.6 per 1,000. The death rates from enteric fever, diphtheria, and phthisis are the lowest on record, and that from scarlet fever, with one exception, the lowest. Influenza shows the lowest mortality since 1917, and whooping-cough since 1919. Cancer shows the highest rate yet recorded.

REPORT OF THE METROPOLITAN ASYLUMS BOARD.

The report of the Metropolitan Asylums Board for the year ending May 31st, 1924, is a little larger than the report for the previous year. The period dealt with would have been characterized by a low demand on the Board's hospitals for infectious diseases, in consequence of the great fall in scarlet fever, had it not been for the occurrence of an epidemic of measles. With regard to scarlet fever, 10,115 cases were notified—a smaller number than that in any year since 1891, with the exception of the years 1916-18. The deaths from scarlet fever in London numbered 116, representing a rate of 2.27 per 1,000 of the deaths, and 0.02 per 1,000 persons living. The high incidence of diphtheria during the scarlet fever epidemic in 1920-22 continued when the epidemic as a whole had waned, and persisted in a modified degree; during the year under review 8,363 patients were admitted, as compared with 12,752 in the previous year. The high level maintained by this disease indicates the importance of combating it more effectively by early antitoxin treatment and rapid removal

of patients to hospitals. The Board arranged during the year for the application of the Schick test in connexion with the training ship *Exmouth*. Out of 626 boys tested, 541 gave a negative result, indicating immunity from diphtheria, and 85 gave the positive reaction, showing that they were susceptible to the disease. All except 8 of the susceptible patients received immunizing injections, and were retested at intervals, reinoculation being continued until immunity from diphtheria was established. No cases of typhus fever have been admitted to the Board's hospitals during the last four years; this disease is therefore to be omitted henceforth from the annual tables of statistics, and the occurrence of any sporadic cases will be recorded by a special note in future. Enteric fever has reached so low a level that it cannot be satisfactorily compared with scarlet fever and diphtheria by means of graphic charts; this disease in future will therefore be omitted from the charts, but the actual figures will continue to appear in the statistics. The number of cases of enteric fever notified in the decade 1890 to 1899 was 33,013; in the following decade 22,073; in 1910 to 1919, 6,835 cases were notified; and during the four years 1920 to 1923 only 1,336 cases. From this summary the striking nature of the fall in the incidence of the disease is clear. Encephalitis lethargica, which first appeared in London about 1917 as a disease to be regarded with special consideration, has since increased considerably. During 1920 there were 141 cases notified, and in 1921 233 cases of the disease occurred; in the two following years 67 and 101 cases, respectively, were notified, but during the first five months of 1924 the notifications totalled 337. The metropolis appears to experience a greater incidence of measles about every two years; this was observed last in 1922. Though the disease is not generally notifiable in London, some indication as to its prevalence during 1922 is derived from the fact that over 34,000 cases were reported among children attending the London County Council schools. Towards the end of 1923 the number of cases showed a marked increase, having risen from 350 on November 30th to 624 on December 31st; thus, of the 817 cases admitted during 1923, over half were received during the last two months of the year. In view of the fact that the incidence of this disease is usually greatest during the first quarter of the year, the Board made as large provision as possible, and from December 1st, 1923, to May 31st, 1924, 4,900 cases were received by the Board; on the latter date there were still 866 under treatment. The highest number of patients under treatment at any one time was 1,611 on April 8th; the similar highest number recorded in any previous epidemic was 958, on March 19th, 1923. The Ministry of Health expressed appreciation of the Board's action in making this substantial provision for measles.

In conjunction with the London County Council, the Board is engaged in investigating the cause of middle-ear disease, with a view to its prevention. When a child who had had ear disease was discharged from the Western Hospital a report was sent to the London County Council, and so far no case had been traced in which the disease had started again. Three of the Board's medical officers have received special training in otology, and the administrative procedure, which had been hitherto experimental and had been found to be satisfactory at the Western Hospital, will now be introduced into two other of the Board's hospitals. A clinic was opened in January, 1924, at St. Margaret's Hospital, Kentish Town, to deal, in the first instance, with the after-care of children who had been under treatment for ear disease at the Downs Hospital.

Medical instruction in fevers during the year was given to 796 students, and 80 students attended courses of instruction in hospital administration for the diploma in public health. The Board has revised the arrangements in this respect so as to comply with the new regulations of the General Medical Council for the diploma examination.

The report contains a note to the effect that the deaths from cancer among patients aged 45 years and upwards, certified under the Lunacy Acts in the Board's mental hospitals, were very low when compared with the cancer mortality for London at the corresponding ages. For example, in 1923, in the Board's mental hospitals, 15 out of 423 deaths were due to cancer, a percentage of 3.54, whereas among the population of London, out of a total of 33,056 deaths, 5,535 were due to cancer, a percentage of 16.74.

The total expenditure for the year, other than out of loans, amounted to £2,443,926, of which £1,994,095 was chargeable to the rates, equivalent to a rate of 9.79 pence in the £. The estimated expenditure for the year 1924-25 indicates a reduction, it is stated, to a rate of 7½d. in the £. The Metropolitan Asylums Board serves an area of 121 square miles, with a population of over four and a half million. The Board's institutions include 14 hospitals for infectious diseases and 5 for mental diseases; 9 institutions for tuberculosis and 2 for venereal disease; a training colony for improvable imbeciles and one for sane epileptics; the *Exmouth* training ship, with its infirmary on shore, and a sea-going tender accommodating 770 boys; 5 children's institutions, 10 casual wards, and a land and river ambulance service, which was responsible during the last year for 61,509 removals.

Scotland.

Lunatics and Mental Defectives.

THE tenth annual report of the General Board of Control for Scotland, dealing with the year 1923, states that the number of insane and mentally defective persons in Scotland on January 1st, 1924, was 21,078. Of this number 18,389 persons were certified insane and 381 persons were admitted voluntary inmates of asylums. Of the total number of insane, 3,595 were inmates of Royal asylums and 11,649 of district asylums; 1,917 were maintained in a private asylum or in private dwellings licensed for the purpose; 1,105 were inmates of the lunatic wards of poorhouses, and 69 were detained as criminal lunatics. The Board considered that the tendency to allow patients to enter voluntarily should be encouraged, as it gives them an opportunity of undergoing treatment by persons skilled in mental disorders at an early stage of mental illness while prospects of recovery are still great. This procedure has been followed more in some asylums than in others; and in one of the Royal asylums the admission rate of voluntary private patients has actually exceeded that for certified private patients. Voluntary entrance on the part of pauper patients is hindered by the fact that the lunacy grant of £115,000 is paid to parish councils towards the cost of certified lunatics only. Nevertheless, ten parishes in Argyllshire have agreed to give facilities for any persons in their districts who require institutional care on account of their mental condition to enter a district asylum voluntarily as rate-aided patients. It is reasonable to suppose that pauper patients, like private patients, would prefer to enter asylums voluntarily if they were permitted to do so by a rearrangement of the incidence of the lunacy grant. If this could be arranged, the certification of patients, which is not necessary for medical purposes, would decline to about 60 per cent., or even less, of the patients admitted to asylums. The Board considers that this would be an advantage, as certification of the insane would then fall into its proper place as a social and legal necessity.

Attention is directed to the question of how much an asylum should be allowed to grow. While experience has shown that large institutions generally can be more economically managed from an administrative point of view, it is believed that, in the case of asylums, large institutions tend to be less efficient from that of the interests and welfare of the patients. The Board, therefore, will examine very closely any proposal so to extend an asylum that the number of 700 patients will be exceeded. It is suggested that the necessity for increased accommodation can often be obviated either by the establishment of observation wards or by boarding out all quiet and harmless cases, or by separating all mentally defective persons from those who are of unsound mind. Special attention is directed towards the last consideration.

In some districts there appears to be a tendency to send mentally defective persons, who have been reported by an

education authority as difficult to educate, into the district asylum; the Board of Control deprecates this practice. For the great majority of mentally defective persons the process of education, whether in special schools or classes or in special training institutions for juvenile and adult defectives, develops their capabilities to the greatest extent, so as to fit them at least to take care of themselves and to live useful lives under the care of others. The benefits of education, in the broadest sense of the term, will ultimately fit mentally defective children for home life under the care of parents and relatives, or, in cases where this is unsuitable, they can be most satisfactorily dealt with by being boarded out in circumstances closely approaching home conditions. It is pointed out that, on the other hand, the treatment of the insane is wholly of a medical nature. Several institutions for the reception and training of mental defectives have recently sprung up. The Edinburgh District Board of Control has started a new institution at Gogarburn which it is desirous of making the nucleus of a place for the training of juvenile defectives and for the establishment of a colony system for adult defectives. The Paisley District Board of Control is considering plans for the erection in the first place of two houses to accommodate fifty defectives of each sex on the same lines as at Gogarburn. A mansion-house at Carstairs, with a large amount of ground attached, has been acquired by the Glasgow authority for a similar purpose. An institution at Whitehall, near Edinburgh, also consisting of a mansion-house within extensive grounds, has been instituted for the accommodation of one hundred mentally defective Roman Catholic children. The Board hopes that such developments, assisted by the mental deficiency grant, may be the means of providing for the education and training of juvenile and adult defectives, who may thus be prevented from drifting into criminal habits owing to absence of necessary institutional care.

The Board suggests that patients labouring under the mental states incidental to old age, who now constitute almost 20 per cent. of the admissions to asylums, could probably with advantage be cared for in places more nearly approaching the nature of cottage hospitals and homes than in elaborate and expensive institutions like modern asylums.

In the ninth annual report extensive reference was made to the observation wards established at the general hospital at Stobhill and the Eastern District Hospital at Duke Street, Glasgow. It is believed that the much needed rest which these wards afford, the efficient nursing, and special care and treatment given to patients in the early stages of mental disease often prevent a complete breakdown and obviate the need for certification. The experience that has been gained, as the result of the treatment of early cases of mental disorder in circumstances which are exactly similar to those of general hospitals throughout the country, prove that the divorce between patients suffering from physical disorder and patients suffering from mental disorder is artificial. The Board has come to the conclusion that powers should be given to establish nursing homes, hospitals, outdoor and indoor clinics, particularly by arrangement with the managers of general hospitals throughout the country, in which anyone desiring advice, care, and treatment may receive these as a voluntary patient. Such an arrangement at hospitals would tend to dispel the natural fear that persons seeking advice, care, and treatment might have that they could be certified as insane and detained against their own free will.

Training for Juvenile Unemployed.

In a report to the education authority of Edinburgh, Mr. D. M'Nally, organizer of continuation classes, states that a dangerously large proportion of the men and women of the future are acquiring the loafing habit when they should be learning some skilled occupation. On April 21st, 1924, there were on the unemployed registers in Scotland 5,053 boys and 4,523 girls between the ages of 14 and 18. Of these 474 boys and 396 girls were in Edinburgh, and 2,700 boys and 2,500 girls in Glasgow. The Government is realizing the importance of preventing these juvenile unemployed from losing the habits of regularity, punctuality, and discipline, and has asked education authorities to co-operate with it by opening juvenile unemployment centres where a certain amount of educational and recreational work is provided for them. Under the Unemployment Insurance Act of 1920 there is power to require attendance by juvenile unemployed at educational centres. Owing, however, to financial considerations, centres have been opened in only some six or seven towns. The Government has now intimated that it is prepared to pay the total out-of-pocket expenses of authorities carrying on juvenile unemployment centres. In Edinburgh the position is fairly good, as voluntary day schools which were opened in 1914 have been steadily growing in popularity. At the present time, of the 870 juvenile unemployed between the ages of 14 and 18, 200 are in regular attendance at workshops, and nearly 300 attend voluntary day centres. It is suggested that all juveniles leaving the day schools without having secured employment should be drafted into suitably situated schools where they would be shielded from the deteriorating effects of continued unemployment and also receive a preliminary training which would determine the trade in which they might afterwards be most usefully employed. The labour market appears to be improving in certain towns in the Glasgow area, where juvenile unemployment centres established about a year ago have been now closed as most of the unemployed juveniles between 16 and 18 have been absorbed.

Ireland.

Sir Patrick Dun's Hospital.

The Board of Sir Patrick Dun's Hospital, in the course of a public appeal for £100,000 to rebuild the institution, states that repeated efforts have been made to alter and improve some of the arrangements of the hospital, but the main fabric of the building remains substantially as it existed one hundred and twenty years ago, and, after careful investigation, it has been found impossible to alter it to meet modern requirements except at a prohibitive cost and with a questionable result. It is a well known fact that conditions prevailing in Dun's Hospital are common to a number of Dublin hospitals, as evidenced by the numerous references to this condition of things at annual meetings of hospitals and elsewhere. The Board observes that citizens of Dublin recognize with pride and satisfaction the eminence and renown of its leading physicians and surgeons, and it is due to the fact that they have kept pace with the most advanced medical science and practice that they have been, and are, insistently calling the attention of their various hospital boards to the inadequacy of the existing buildings and equipments, and are urgently calling for facilities that cannot be provided by their boards, except in a very inadequate way, owing to the twin obstacles of construction and finance. Thus physicians and surgeons in Dublin are handicapped at every turn in a department of civic life where to stand still means decay, and to decay means death. The Board is well aware that there exists a growing feeling amongst the citizens that there are too many hospitals in Dublin, and that a number of them could be amalgamated into one large general hospital. The Board is of the opinion that the work now proposed to be done will be a step towards the realization of its ideals. The hospital is close to a very large industrial section of Dublin, and is convenient to both doctors and students. Over 25,000 extern patients and over 1,500 intern patients were treated in the hospital during the last year. The Board also undertakes at conferences to work towards joint action in obtaining for Dublin a large grant from some of the great medical foundations of the world, on the lines of the Rockefeller grant of £1,205,000 recently made to a London hospital, so that Dublin may be made a great centre in which surgical and medical research and development may be promoted and fostered. The success of the appeal now being made is, in the opinion of those qualified to judge, an essential preliminary to securing such a grant.

Correspondence.

X-RAY INTERPRETATION.

SIR,—I think Sir Thomas Horder is to be congratulated on his letter in the JOURNAL of August 23rd (p. 344).

There seems to be an idea prevalent amongst some radiologists that when the clinician has exhausted all his skill he refers his difficulties to the *x*-ray department for a final solution, and that therefore a definite diagnosis must be given. Personally I am very happy to be quite sure of a simple fracture.

Surely the function of the radiologist is to give one more clue to the clinician who correlates all the evidence of his own senses, together with special departmental reports, and arrives, at any rate, some way towards a diagnosis. Such, at any rate, is my teaching to students with whom I come in contact, and only in this way can we be of real value to the science, and take our proper place in the scheme of things.—I am, etc.,

London, S.E.1, Aug. 23rd. GEOFFREY FILDES.

NON-OPERATIVE TREATMENT OF TUBERCULOUS CERVICAL GLANDS.

SIR,—"Quite Well" has given us what is perhaps an unexampled record of such data and experience as people in the Middle Ages used to pin their faith on the touch of a regal hand for the cure of scrofula in its various manifestations. The touch confirmed the faith and the faith got what it needed—*time*—for the body to gain the upper hand over its enemy, the tubercle parasite. Time, however, is of but little value unless there be a period of body growth to run. He has also prompted an interesting question—namely, What would, in all probability, have been the record of his life if when the cervical glands were first judged to be tuberculous in their nature they were at that time completely removed by operation? I conjecture, from experience, that the record would be blank from 9½ to 44 years, apart from accidents, and that robust health would have replaced an existence that a youth may and does tolerate and a survivor considers as *all right*.—I am, etc.,

Cambridge, Aug. 25th. JOSEPH GRIFFITHS.

SOME OPINIONS ON CANCER.

SIR,—In your issue of August 23rd you reviewed my book, *Cancer: How it is Caused and How it can be Prevented*, under the heading "Some opinions on cancer," and you state in it that, according to my opinion, cancer "is caused by intestinal stasis, and this in turn is due to chronic vitamin starvation." I am afraid that phrase does not quite correctly summarize the doctrine of my book. I have stated in my volume dozens of times that in my opinion cancer is caused by chronic poisoning and vitamin starvation. Among the chronic poisons are not merely bowel poisons, due to stasis, but chemical poisons, such as arsenic, aniline, etc., and other chemical poisons which we are entitled to suspect as cancer producers, such as poisonous chemical preservatives and colouring matters, many of which are derived from coal tar, which in itself is a cancer poison. Besides, I mentioned chronic poisoning in the form of chronic burns, burns having an action equivalent to poison, and I gave details about *x*-ray and radium burns, concluding that chronic burning by over-hot drink produces the equivalent of kangri cancer in the human oesophagus and stomach. I trust that, in common fairness, you will allow me to make this correction. I attribute the very greatest importance to chronic burns due to over-hot drink. We take our tea and coffee at 150°, whereas the hot bath has 105° or so; and many cases of cancer of the stomach or of the oesophagus which have come under my notice were undoubtedly due to this dangerous habit.

I note with regret some disparaging remarks due to the fact that I am not a medical man. The BRITISH MEDICAL JOURNAL is distinguished for its broad-mindedness and fairness, and I am sure that you will agree with me that the most important medical and surgical discoveries were made, not by qualified medical men, but by outsiders, savages, and animals. Modern surgery and medicine are based upon the observations of illiterate milkers, who discovered that cow-pox protected against small-pox, observations which Jenner made use of and published, and upon the discoveries of Pasteur and Metchnikoff, who were non-doctors. My cancer theory may be useful or it may be useless. I think it will prove useful. At all events, my book has been received with enthusiasm by a great many eminent medical men and writers, among them some cancer specialists. Besides, I am receiving every day, from medical men and others, most valuable confirmatory evidence in support of my theory that cancer is a disease of civilization, and that it is due to chronic poisoning and vitamin starvation. Some of the evidence will be published in the September issue of the *Fortnightly Review*, and other material will appear in the *Spectator*.—I am, etc.,

London, N.2, Aug. 25th. J. ELLIS BARKER.

SIR,—With respect to your review "Some opinions on cancer" in your issue of August 23rd (p. 324), I should like to make a suggestion or two, purely as an ordinary general practitioner of many years' experience.

Is it possible that intestinal stasis (termed in the vulgar tongue, constipation), given as a cause, is merely one of the early symptoms of cancer? In many cases of intestinal carcinoma, constipation is one of the most insistent of the early symptoms; later, and especially where the growth is low down, alternating with or replaced by diarrhoea.

What strikes one in general practice is the infinitesimal proportion of people suffering from chronic constipation for many years who ever develop carcinoma. One might almost as logically formulate a theory that chronic constipation is a great safeguard against carcinoma, as so small a proportion of people chronically suffering from the former ever develop the latter!

Secondly, as regards deficiency of vitamins as a cause of carcinoma (leaving, as Mr. Ellis Barker does, sarcoma out of the question), may I suggest that, from all one has observed, heard, and read about carcinoma, all the facts seem to point to its being an excess disease (like gout, etc.), rather than a deficiency disease (like rickets, etc.)?—I am, etc.,

Flackwell Heath, Bucks, Aug. 25th. G. D. PARKER.

POOR LAW PATIENTS AND FREE CHOICE OF DOCTOR.

SIR,—The motion urging "free choice of doctor for Poor Law patients," presented by the Dartford Division at the Annual Representative Meeting at Bradford, was carried by general consent, limited, however, in the resolution to "domiciliary attendance," which, in fact, was the intention of the Dartford Division.

A number of inquiries have been made since as to how the principle is intended to be applied in the Dartford Union. The practitioners agreed with the Dartford Board of Guardians to attend—

(*a*) *ordinary outdoor patients* for a capitation payment of 17s. 6d. per case; (*b*) *recipients of temporary relief* at the rate of 7s. 6d. per quarter, such being classed as ordinary after the expiry of three months.

The number of practitioners attending the sick poor will be increased sixfold, which means improvement in the service, with economy in time spent and mileage covered.

The high sickness incidence among the poor is balanced by the provision of a prompt system of admission with ambulance service to a well equipped hospital adequately elastic in accommodation, so that there is no "waiting list" blocking admissions at any hour, the attendance on difficult and complicated cases being thus greatly relieved.

I will not succumb to the temptation to discuss "hospital policy" in relation to "national health and private" practice, my intention being to reply to the inquiries from Derbyshire and elsewhere.—I am, etc.,

M. W. RENTON,
Representative, Dartford Division,
British Medical Association.

August 23rd.

THE R.A.M.C.(T.A.).

Sir,—The letters appearing in the British Medical Journal on the R.A.M.C.(T.A.) show that a good deal of interest has been aroused. Surely it is false economy to have abolished two field ambulances in London, for instance, and to have housed the remaining ambulance in totally inadequate headquarters.

To bring recruits to the ranks surely the Territorial should occasionally be seen on parade. The annual inspection in Hyde Park of Volunteer days served a useful purpose in showing Londoners their citizen troops.

A smarter kit than khaki is urgently needed for ceremonial and "walking out" purposes. Full dress for such occasions should be gradually reissued. It engenders a feeling of *esprit de corps* and self-respect, and stimulates recruiting.—I am, etc.,

August 23rd. Ex-Volunteer.

ALCOHOL AS A NARCOTIC POISON.

Sir,—I was interested to read in the Supplement to the Journal of August 2nd, in the account of the temperance breakfast at the meeting of the British Medical Association at Bradford, that Sir William Willcox is reported to have said that "to quote Dr. W. E. Dixon, the most that could be said for alcohol was that it was one of the less harmful narcotic poisons." I should very much like to know whence Sir William Willcox obtained his quotation, because I have failed to find any such statement in Dr. Dixon's works. Perhaps Sir William Willcox will be good enough to give the reference?—I am, etc.,

Elisabeth Williams,
Secretary, True Temperance Research Committee.
Donington House, Norfolk Street,
Strand, W.C.2, Aug. 18th.

Obituary.

Dr. John Lascelles, who died suddenly of heart failure on August 16th at his residence at Earlestown, Lancashire, was born in July, 1892, at Downpatrick. He matriculated at Queen's University, Belfast. He won scholarships in the second and third medical examinations and a special exhibition in surgery in the final examination for the degrees of M.B., B.Ch., and B.A.O., which he took with honours in June, 1917. He joined the R.A.M.C. as lieutenant, being subsequently promoted to captain, and saw service in East Africa and Constantinople. On demobilization he went into general practice at Earlestown. He was a member of the St. Helens Division of the British Medical Association. In November, 1921, he married a daughter of the late Dr. Wallace of Rochdale, by whom he is survived, and for whom deep sympathy is felt.

Dr. T. McCraith Foley of Scarborough died on August 24th, aged 65. He was the son of the late Rev. Patrick Foley, rector of Kilscoran, co. Wexford, and received his medical education at the Ledwich School of Medicine and the Royal College of Surgeons in Ireland. He took the diplomas of L.R.C.P. and S.I. in 1880, and that of L.A.H.Dubl. in the following year. In his early days he was surgeon on the Sultan of Morocco's yacht, and afterwards served as ship surgeon on liners going to America. About thirty years ago he settled in practice in Scarborough. He served with the 5th Yorkshire Regiment (Territorial Army) and retired with the rank of lieutenant-colonel. During the war he was attached to the R.A.M.C. (1914-17), and was D.C.M.S. (1917-18). He was formerly a member of the Scarborough Town Council and chairman of the Health Subcommittee. Owing to ill health he retired from private practice about three years ago. Dr. Foley, who was a member of the Scarborough Division of the British Medical Association, is survived by his widow.

Dr. Frank Elvy died at Fouriesburg, Orange Free State, in May last, from heart failure following pneumonia, after fifteen days' illness. He was 58 years of age. He studied medicine at the Middlesex Hospital Medical School, and took the diplomas of the English Conjoint Board in 1893. For a time he practised at Eastbourne, where he was surgeon to the Lady Wellesley Hospital and Dispensary, but owing to asthma and bronchitis was compelled to leave this country. He was district surgeon at Fouriesburg and a member of the Orange Free State and Basutoland Branch of the British Medical Association. He was held in high esteem by his patients and a large circle of friends. He is survived by his widow and three daughters.

The Services.

DEATHS IN THE SERVICES.

Captain David Hamilton Hadden, *M.C.*, R.A.M.C., died at the Military Barracks, Omagh, County Tyrone, on June 18th, aged 32. He was the eldest son of Dr. W. E. Hadden of Portadown, County Armagh, and was educated at Trinity College, Dublin, where he graduated B.A., M.B., B.Ch., and B.A.O. in 1913, gaining the University Fitz-Patrick scholarship and the Haughton clinical prize and medal in surgery at Sir Patrick Dun's Hospital. After filling the post of house-physician at the county hospital, York, he took a temporary commission as lieutenant in the R.A.M.C. on September 26th, 1914, was promoted to temporary captain after a year's service, and confirmed as captain from March 26th, 1918. He served throughout the war of 1914-18, and received the Military Cross on September 16th, 1918, with a bar on April 2nd, 1919, and also the M.B.E.

Surgeon Lieutenant-Commander G. A. Melville Anderson, R.N., died suddenly in the Royal Naval Hospital, Plymouth, on July 26th. He was the eldest son of the Rev. D. Anderson, parish minister of West Calder, and was educated at Edinburgh, where he graduated as M.B. and Ch.B. in 1913, after which he entered the navy, reaching his late rank on April 24th, 1920. At the time of his death he was serving on H.M.S. *Impregnable*.

Medico-Legal.

THE WORKMEN'S COMPENSATION ACT.

A remarkable decision is recorded in the Gloucester daily paper *The Citizen* of August 6th as having been made in the Gloucester County Court in a compensation case, which exemplifies the readiness of not a few courts to accept *post hoc* as if it were *propter hoc* in claims for compensation. In the case in question it appears that the husband of the applicant had been suffering from diabetes for some years, and while at work on November 9th, 1923, he sustained a wound on the right shin. He was away from work for about eleven weeks, but was declared by his medical attendant fit to resume work on January 25th, and did so. Some time later his right leg became swollen, and on April 10th he had a stroke with right-sided paralysis, and died on April 19th. At the time of his death he had a small patch of commencing gangrene on his other foot. There was some discussion in the court as to whether the stroke was due to cerebral haemorrhage or embolism. The medical officer who attended him when he was admitted to the infirmary after the stroke felt confident that death was caused by cerebral haemorrhage directly due to advanced diabetes, and said that the accident in November had had nothing to do with the stroke in April. In spite of this definite opinion of the medical man, who had had the fullest opportunity of attending and treating the case, the county court judge, without referring the matter to the referee or making use of his services as medical assessor, and while describing the case as an extremely difficult one, gave judgement in favour of the applicant's claim for £289 with costs.

Evidence connecting the accident in November with the death in April was very slight, and judgements of this sort will inevitably tend to make employers of labour chary about engaging or retaining in their employment men suffering from diabetes or any other disease where there is any chance of claims of this character succeeding in a court of law. We cannot help feeling that the excellent provisions of the Workmen's Compensation Act are in some danger of being exploited in this and not a few other cases of a parallel character, and there is some reason to demand that a quite natural sympathy with the employed should be tempered with justice to the employer.

Universities and Colleges.

SOCIETY OF APOTHECARIES OF LONDON.

The following candidates passed in:

Surgery.—M. Bannounah, E. H. Boodrie, J. Crawford, F. M. Deighton, C. S. Forrest, J. W. Graham, J. C. C. Langford, Z. Roodyn, C. W. Warne.

Medicine.—F. M. Deighton, J. W. Graham, G. L. W. Iredale, W. R. S. Jaecques, A. J. Moody, H. Morris (Section II), W. E. Pennington, Z. Roodyn, J. G. E. Vachell.

Forensic Medicine.—H. L. Bernstein, A. K. A. Carter, F. M. Deighton, R. C. Glover, J. W. Graham, A. J. Moody, W. E. Pennington, B. A. Perott, M. Schwartzman, Z. Roodyn.

Midwifery.—W. Bentley, F. M. Deighton, J. W. Graham, J. C. C. Langford, E. J. P. McDowell, W. E. Pennington, Z. Roodyn.

The Diploma of the Society has been granted to Messrs. J. Crawford, F. M. Deighton, J. W. Graham, G. L. W. Iredale, J. C. C. Langford, H. Morris, Z. Roodyn, and J. G. E. Vachell.

DEATH OF SIR WILLIAM BAYLISS.

As we go to press we hear of the death of Sir William Bayliss on Wednesday, too late in the week to permit us to publish any adequate obituary notice. He had been ill for nearly a year. He was born in 1860 and began the study of medicine early, but never entered the profession. He was one of the men who had done most to make the English school of physiology great. He was a pupil of Sanderson and Schafer, who had both been pupils of Sharpey, and Bayliss himself was associated with the physiological department of University College, London, nearly all his working life. He was extraordinarily modest about his own researches, many of them done in collaboration with others, some of the most important with his brother-in-law, E. H. Starling, and it is quite possible that he is best known and will be longest remembered for his book on the *Principles of General Physiology*, which might be called a textbook for professors. The conception of the work was quite original, and one aspect of Bayliss's interests is shown by the numerous portraits introduced and by the way in which his extensive acquaintance with the history of physiology was woven into the text. It was first published in 1914, and when a fourth edition was called for a short time ago, and Bayliss was not well enough to undertake it, a committee of the younger physiologists, with Professor A. V. Hill at their head, was formed to supervise it.

Medical News.

THE offertory at the official religious service held in Bradford Cathedral in connexion with the recent Annual Meeting of the British Medical Association amounted, after deducting the church expenses, to £37. The executive committee of the meeting, having increased the sum to £40, has divided the amount equally between the local hospital fund and the Royal Medical Benevolent Fund.

THE Prince of Wales, as President of King Edward's Hospital Fund for London, has appointed the following persons a committee to exercise the powers of President of the Fund during his absence: The Earl of Donoughmore, Viscount Cave, and the Governor of the Bank of England.

THE annual dinner of the past and present students of University College Hospital will be held at the Hotel Cecil on Friday, October 3rd. Dr. Michael Foster, O.B.E., will take the chair at 7.30 p.m. Tickets can be obtained from the secretaries, Dr. Gwynne Williams and Dr. T. R. Elliott, University College Hospital Medical School.

As announced in our advertisement pages, applications for the William Julius Mickle Fellowship of the University of London should be sent in before October 1st to the Academic Registrar, University of London, South Kensington, S.W.7, from whom further particulars can be obtained. The fellowship, which is of the value of at least £200, is awarded by the Senate to the graduate of the University resident in London who has done most to advance medical art or science during the previous five years.

THE following courses are announced by the Fellowship of Medicine and Post-Graduate Medical Association: On September 1st a two weeks' course in dermatology will commence at the Hospital for Diseases of the Skin (Blackfriars), consisting of instruction in the out-patient department every afternoon from 2.30, and a venereal clinic twice a week from 5.30. Beginning on September 8th, a three weeks' course in ophthalmology at the Royal Westminster Ophthalmic Hospital will include clinical instruction each afternoon from 2 o'clock, and special demonstrations three times a week on methods of examination and common affections of the eye. A fortnight's course at the Infants Hospital from September 15th to 27th will deal with diseases of infants from various aspects, and consist of clinical demonstrations, "round table" consultations, lectures, etc. Visits will be made to St. Margaret's Hospital for Ophthalmia Neonatorum, Thavies Inn (Holborn), and the Nursery Training School (Golders Green). Further information may be had on application to the Secretary, Fellowship of Medicine, 1, Wimpole Street, W.1.

THE August number of *Medical Science*, published on behalf of the Medical Research Council, contains a review by C. da Fano of the investigation of spontaneous and experimental encephalitis in rabbits. The number contains also reviews and abstracts of medical and scientific journals.

THE Home Secretary, at the instance of the National Society of Pottery Workers, has directed an inquiry to be made into the incidence of silicosis in the pottery industry, in order to decide whether it should be scheduled as an industrial disease under the Workmen's Compensation Act.

THE annual congress of the National Veterinary Medical Association of Great Britain and Ireland will be held at Aberdeen from September 8th to 15th.

Letters, Notes, and Answers.

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.* Authors desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Financial Secretary and Business Manager, 429, Strand, W.C.2, on receipt of proof.

Communications intended for the current issue should be posted so as to arrive by the first post on Monday or at latest be received not later than Tuesday morning.

ALL communications with reference to advertisements as well as orders for copies of the JOURNAL should be addressed to the Financial Secretary and Business Manager, 429, Strand, London, W.C.2. Attention to this request will avoid delay. Communications with reference to editorial business should be addressed to the Editor, BRITISH MEDICAL JOURNAL, 429, Strand, W.C.2.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—not necessarily for publication.

THE telephone number of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is Gerrard 2630 (Internal Exchange). The telegraphic addresses are:

EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology Westrand, London.*

FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westrand, London.*

MEDICAL SECRETARY, *Medisecra Westrand, London.*

The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin;* telephone: 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh;* telephone: 4361, Central).

QUERIES AND ANSWERS.

"N. M. C."—No notice can be taken of communications not verified by the writer's name.

THREADWORMS.

"J. E. W." asks for advice in the treatment of threadworms in an adult. All the usual remedies have been tried assiduously, and for a time each seems to be successful, but after a few weeks the threadworms seem to return as numerous as before. The case is of some years' standing, and has had careful treatment for over a year.

INCOME TAX.

Expenses, Subscriptions, and Motor Car.

"L. L." writes to say (*a*) that the inspector of taxes has disallowed his claim to deduct subscriptions paid to the Medical Defence Union and to the Birmingham Medical Benevolent Society; and (*b*) that £10 of £86 claimed for car expenses had been refused on account of private use of the car.

*** (*a*) With regard to the subscriptions, we understand that it has been definitely agreed that subscriptions to the following bodies are allowable: the London and Counties Medical Protection Society, the British Medical Protection Society, the Royal Society of Medicine, and the British Medical Association. Whether any particular subscription is allowable as being analogous to those paid to these bodies depends on the constitution and rules of the society. The position of the Medical Defence Union has not yet, we understand, been actually determined. (*b*) £10 out of £86 seems to be a high proportion for private use, but "L. L." should take into account apparently not only petrol but also oil, wear and tear of tyres, etc. We suggest that in putting the amount at £10 the inspector may have taken into account the wear and tear of the car as a whole, whereas, assuming that there is no depreciation or replacement cost in the £86, the amount should be limited to running costs only.

LETTERS, NOTES, ETC.

FOREIGN BODIES IN THE EAR.

DIXON (Kansas City), being baffled in removing from the external auditory meatus a cherry-stone which fitted the canal too exactly, resorted (*Journ. Amer. Med. Assoc.*, vol. 83, p. 357) to the use of dental cement, which sets very quickly. The cement was mixed fairly thick and taken up with a camel's-hair brush, by which it was held firmly against the cherry-stone for a couple of minutes; when withdrawn it brought the foreign body with it.

HELMINTHOLOGY.

A NEW volume of collected papers from the Department of Helminthology of the London School of Tropical Medicine has been issued. It is dated July, 1924, and contains seventeen papers, reprinted from various journals, chiefly the *Journal of Helminthology*; there are two from the *Proceedings* of the Royal Society of Medicine and one from our own columns. The papers are well illustrated, and specialists will find the volume convenient for reference.

POOR LAW PATIENTS AND FREE CHOICE OF DOCTOR.

DR. T. MURRAY (Killamarsh) informs us that the Chesterfield Rural District Council has adopted the following resolution:

> That the members of this Board are of opinion that the time has arrived when recipients of out relief should be permitted a free choice of doctor in case of sickness; that the Ministry of Health be asked to provide therefor by the issue of an Order authorizing the formation of a district medical officer panel, subject to such conditions and restrictions as may appear to the Ministry to be necessary.

This matter is also referred to at page 389.

CATERPILLAR DERMATITIS.

DR. A. S. GUBB (Algiers) writes: With reference to Dr. Castle's remarks on caterpillar dermatitis, in your issue of August 2nd (p. 218), it may interest him to know that over here there is a very interesting variety of the hairy caterpillar—the processional caterpillar, so called because they are met with in the spring in series many yards long, nose to tail. They are covered with brilliantly and variously coloured long hairs, which are extremely brittle. When handled these hairs break off and penetrate the skin, where they set up itching comparable only to that caused by the bristles of the prickly pear (now in season). In subjects with sensitive skins the irritation determines very troublesome urticaria, which may last for several days. I saw an instance of this last summer when an American child made pets of some of these caterpillars and suffered in consequence. Their nests are conspicuous in the branches of the *Pinus halepensis*—woolly masses the size of a large orange. Visitors are warned not to sit under these nests lest some of the hairs should perchance come their way. Fabre, the great French entomologist, devotes a delightful chapter to these insects, which are evidently met with in the South of France, where he lived.

PHYSICAL EXERCISES FOR RURAL SCHOOLS.

THE Board of Education has issued a pamphlet (price 3d.) giving information regarding the teaching of physical exercises and games in rural schools. Experience has shown that many of the smaller rural schools find difficulty in making a suitable adaptation of the tables given in the Board's Syllabus of Physical Training. The difficulty in arranging a satisfactory course of physical training for these small schools is chiefly due to the fact that children of different ages have to be taught together and that facilities are limited. The new tables are designed to meet the needs of these small schools, in which the utmost simplicity consistent with adequate results is essential. They are constructed primarily for schools with only two teachers, but they can be adapted to schools with three teachers or only one teacher. In schools with only one teacher the fullest possible use is to be made of the older children as team leaders. The purpose is to give the children exercise—a fact that is often forgotten. Active movement is an essential element in physical training; postures and positions are useful only in so far as they ensure that the movement, the essential exercise, is of the most beneficial kind. In order that the children may be well exercised they need to repeat the movements of the exercises a sufficient number of times and carry them out with plenty of energy. Limply stretching the arms sideways a couple of times is not beneficial exercise, and strengthens neither the body nor the will. Children come to no harm by working as hard as they can while they are at it; on the contrary, being generally active and alert, that is the way in which they reap the full benefit of their lesson. When children play by themselves their output of energy is enormous, and this is Nature's way of securing the healthy development of their bodies. Stress is laid upon the necessity for giving free practice in the movements of an exercise. The teacher should tell the children what to do, and then let them try it for themselves. Accuracy of performance must be insisted on if the exercises are to fulfil their purpose, and this can only be obtained by securing the lively response of the children. The team system, whereby the older children who have become skilful in the performance of the exercises are the leaders and almost the teachers of the younger and newer children, is of the greatest advantage; both benefit—the older by the sense of responsibility and leadership engendered, and the younger, who follow an example which cannot always be given by the older and more sedate teachers. Tables of exercises and games are given graded according to age and condition. Some fault may be found with the manner in which these are set out. There is constant reference to other publications. The majority of the exercises tabled have appended to them such marks as (S.G., p. 24). This is a bad practice. It requires a possibly overburdened teacher to be constantly referring to another or other documents; the waste of time and energy is obvious. It would be far better to make the pamphlet complete in itself. The extra cost entailed would be small and the expenditure would be well worth while.

VACANCIES.

ASHTON-UNDER-LYNE: DISTRICT INFIRMARY.—Resident Surgical Officer (male). Salary at the rate of £200 per annum.

BRIDGE OF WEIR: CONSUMPTION SANATORIA OF SCOTLAND—COLONY OF MERCY FOR EPILEPTICS.—Assistant Resident Medical Officer (male). Salary £200-£250.

COLCHESTER: ROYAL EASTERN COUNTIES INSTITUTION FOR MENTAL DEFECTIVES.—Assistant Medical Officer (unmarried). Salary £300 per annum.

COVENTRY AND WARWICKSHIRE HOSPITAL.—Vacancy on Honorary Surgical Staff.

DEVONPORT: ROYAL ALBERT HOSPITAL.—Resident Male House-Surgeon. Salary £150 per annum with £1 1s. per week additional while working single-handed.

EGYPTIAN SCHOOL OF MEDICINE, Cairo.—(1) Professor of Physics. (2) Professor of Clinical Medicine. (3) Professor of Clinical Surgery. (4) Lecturer on Physics. Initial salary for (1), (2), and (3) £E.900 a year, in a class £E.900-1,400, and for (4) £E.540, in a class £E.540-840.

EXETER: ROYAL DEVON AND EXETER HOSPITAL.—Assistant Physician.

GLASGOW EYE INFIRMARY.—Anaesthetist. Honorarium £100 per annum.

GLOUCESTERSHIRE ROYAL INFIRMARY AND EYE INSTITUTION, Gloucester.—Assistant Physician and Pathologist.

LANCASHIRE COUNTY MENTAL HOSPITAL, Winwick.—Male Assistant Medical Officer. Salary £300 per annum plus bonus, at present £140 16s. 8d.

LEEDS GENERAL INFIRMARY.—Resident Ophthalmic Officer. Salary £120 per annum.

LIVERPOOL SCHOOL OF TROPICAL MEDICINE.—Assistant on the staff of the Sir Alfred Jones Research Laboratory, Freetown, Sierra Leone.

MANCHESTER: ANCOATS HOSPITAL.—Resident Medical Officer. Salary £175 per annum.

MANCHESTER EDUCATION COMMITTEE.—Assistant School Medical Officer. Salary £600 per annum, rising to £750.

METROPOLITAN ASYLUMS BOARD.—Assistant Medical Officer at Colindale Hospital, Hendon. Salary £500 per annum.

NORTHAMPTON COUNTY MENTAL HOSPITAL, Berrywood.—Junior Assistant Medical Officer (male), single. Salary £350 per annum, rising to £450.

NOTTINGHAM CITY.—Resident Assistant Medical Officer at the Bagthorpe Institution and Infirmary. Salary £300 per annum.

REDDITCH: SMALLWOOD HOSPITAL.—Honorary Consulting Gynaecologist.

ROCHDALE INFIRMARY AND DISPENSARY.—Junior House-Surgeon (male). Salary £200 per annum.

ROYAL CHEST HOSPITAL, City Road, E.C.—(1) Physician with charge of Out-Patients. (2) Resident Medical Officer, salary £150 per annum. (3) House-Physician, salary £100 per annum.

ROYAL MANCHESTER CHILDREN'S HOSPITAL, Pendlebury.—(1) Resident Surgical Officer, salary £80 per annum for six months, but eligible for re-appointment as Resident Medical Officer at salary of £120 per annum. (2) Assistant Medical Officer (non-resident) at Out-patients' Department, Gartside Street, salary £150 per annum for six months, but eligible for re-appointment as Medical Officer at salary of £200 per annum.

ROYAL NORTHERN HOSPITAL, Holloway Road, N.—House Surgeon. Salary at the rate of £75 per annum.

SALFORD UNION INFIRMARY.—Third Assistant Resident Medical Officer (male). Salary £275 per annum.

SCARBOROUGH HOSPITAL AND DISPENSARY.—House-Surgeon (female). Salary £150 per annum.

SHEFFIELD ROYAL HOSPITAL.—Resident Surgical Officer (male). Salary £200 per annum.

SHEFFIELD: ROYAL INFIRMARY.—Resident Surgical Officer. £200 per annum.

WEST LONDON HOSPITAL, Hammersmith Road, W.6.—(1) House-Physician. (2) Two House-Surgeons. Males. Salary £100 per annum each.

CERTIFYING FACTORY SURGEON.—The Chief Inspector of Factories announces the following vacant appointment: Milborne Port (Somerset).

MEDICAL REFEREE under the Workmen's Compensation Acts, 1906 to 1923, for the county of Antrim and the county and city of Belfast. Applications to the Secretary, Ministry of Labour, 7, Upper Queen Street, Belfast, by September 15th.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 23, 26, 27, and 28 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 24 and 25.

POST-GRADUATE COURSES AND LECTURES.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole Street, W.1.—*Hospital for Diseases of the Skin*, Blackfriars: Instruction in the Out-patient Department daily from 2.30 p.m. Venereal Clinic, Tues. and Fri., 5.30 to 7 p.m. *West End Hospital for Nervous Diseases:* Daily at 5 p.m. Mon., Tabes Dorsalis. Tues. Orthopaedic Treatment in Diseases of Nervous System. Wed., Examination of the Eye in Nervous Diseases. Thurs., Hemiplegia and Monoplegia. Fri., Investigation of Cranial Nerve Disorders.

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith, W.—Mon., 12 noon, Applied Anatomy. Tues., 12 noon, Chest Cases. Wed., 11 a.m., Medical Wards. Thurs., 2 p.m., Genito-Urinary Department. Fri., 2 p.m., Throat, Nose, and Ear Department. Sat. 10 a.m., Medical Diseases of Children. Daily 10 a.m. to 6 p.m. Sat. 10 a.m. to 1 p.m., In- and Out-patients, Operations, Special Departments.

BIRTHS, MARRIAGES, AND DEATHS.

The charge for inserting announcements of Births, Marriages, and Deaths is 9s., which sum should be forwarded with the notice not later than the first post on Tuesday morning, in order to ensure insertion in the current issue.

BIRTHS.

JOHNSON.—On August 21st, at Wykeham House, Romsey, Hants, to Madeleine, wife of Dr. G. H. Johnson, a son.

MUSGRAVE WOODMAN.—On August 21st, at 132, Hagley Road, Edgbaston, the wife of E. Musgrave Woodman, M.S., F.R.C.S., a daughter.

PEEBLES.—At Salterley Grange, Cheltenham, on August 20th, to Dr. and Mrs. D. J. Peebles, a daughter.

MARRIAGE.

PRITCHARD—COOKE.—On August 9th, John Craven Pritchard, son of the late C. F. Pritchard and Mrs. Pritchard, of 2, The Croft, Hampstead, to Rosemary Cooke, L.R.C.P., M.R.C.S., daughter of Mr. and Mrs. Henry Cooke, of 18, Airlie Gardens, Campden Hill, W.

DEATH.

LASCELLES.—On August 16th, at his residence, Caulfield, Earlestown, Lancs, suddenly, of heart failure, John Lascelles, M.B., B.Ch., B.A.O., aged 32. Buried at Downpatrick Presbyterian Church, August 19th, 1924.